EDITORIAL

Simplicity vs. Complication

IN descriptions of new models we constantly come upon the statement that this or that part has been greatly simplified; the opposite statement, that a part has been made more complicated, is never met with, and still, if a comparison were made of some of the small cars marketed about twenty years ago and the average modern car, a count of parts would undoubtedly show the earlier machines to have had the smaller number and therefore to have been the simplest. At the same time it must be admitted that the modern car is immeasurably better.

Complication is not an object in itself, and of two methods of achieving a certain end the simplest is the best if the results obtained with the two are the same. But this is not generally the case. In order to achieve simplicity some desirable quality is often sacrificed, and the question then arises whether the gain in simplicity warrants this sacrifice.

On the whole, complication, as measured by multiplicity of parts, is not such a bugaboo as it is often believed to be. Provided the parts are right in design there is no reason why the machine as a whole should not give satisfactory service. The watch is a rather complicated piece of mechanism, far more complicated than the hour-glass, for instance, yet it has superseded the latter, and most watch owners do not worry much as to its maintenance.

The Shenandoah

IT is still too early to say definitely what lessons are to be learned from the Shenandoah catastrophe, the fourth of somewhat similar character in as many years. That the destruction of the Shenandoah will mean a considerable set-back for lighter-than-air craft as military and commercial utilities—at least in the mind of the general public—is hardly to be doubted. The opinion of those familiar with the construction of the ship and its handling during its fatal trip seems to be summed up in the statement of Lieut. Charles E. Rosendahl that "Human hands could not have designed a craft to weather the storm the Shenandoah encountered before its fall." In other words, the construction of the ship was not at fault and it had thoroughly competent handling throughout the event. But still the catastrophe occurred. That is the line of reasoning that is going to strengthen the hands of those members of Congress, who even in the past have opposed appropriations for dirigibles as instruments of war.

The necessity for the best possible meteorological service in future dirigible operation is another factor which will be emphasized by the fate of the Shenandoah. Col. C. G. Hall, army observer aboard the airship, stated after the disaster that "Had we had wireless communication, say from Cambridge, we undoubtedly would have been able to head away from the storm entirely. As it was, the commander was obliged to steer away from the approaching clouds without guidance from weather bureau authorities in nearby towns."

It seems to be generally agreed, also, that if the big ship had been using hydrogen instead of helium, it undoubtedly would have caught fire and many more lives would have been lost. To that extent experience gained from previous disasters helped to minimize the effects of this one.

Despite the probability of a temporary setback for dirigible advancement, however, it appears to be certain that active work with lighter-than-air craft will continue to go forward in this country. It is not to be doubted that future activity along this line will carefully consider what lessons are to be learned from the Shenandoah accident and that every caution will be taken to prevent a recurrence of the same difficulties.

Bus Economies

ELECTRIC railway companies are proving by their own experience that bus operation is a sound economic proposition.

Electric lines which have gone into bus operation today are carrying more passengers at a smaller cost per mile than they were a year ago. This is one of the main points developed by a survey just completed by E. J. Murphy, chief statistician, American Electric Railway Association. Six companies, whose records were comparable, operated 122 buses over 224 miles of route in 1924 as compared with 73 buses operated over 98.9 miles of route in 1923. The total cost of operation in 1923 was 24.27 cents per bus mile; in 1924 it was reduced to 21.45 cents per bus mile.

These figures indicate clearly that the electric railways are becoming more expert in bus operating methods. Probably that increased expertness has something to do with the growing favor being met with by the bus in electric railway circles. Everybody looks more favorably on a unit which he can use profitably than upon one which he sees only as a profit to others and a detriment to himself.

It is safe to predict that additional economies will be effected in operating costs as the railway companies add to their experience in handling bus maintenance and repair work. Most of the companies which have gone into bus operation on a large scale already have installed first-class servicing systems and are applying to the upkeep of their buses the same thorough methods which have been used in the past on their trolley cars.

Our Industry Today

August Automotive Production and Sales Set Record for That Month, With Promise of Better Things in September

NEW YORK, Sept. 9—Automotive business is holding at a firm level. August production and sales, even if they did not quite come up to the most optimistic predictions made when the new models and price cuts were being announced, nevertheless set a record for that month, and there is a possibility that the September totals will be even better. An intensive selling campaign by manufacturers and dealers is meeting with response from the public, which apparently has both the means and the desire to invest further in transportation.

Plenty of credit is available in most sections of the country for the financing of sales on the time payment plan and in the West, particularly, this is leading to a further extension of the period allowed for settlement of the unpaid balance. Easy payment terms are perhaps a greater aid to sales than price reductions. A stimulus of another sort, and sounder economically, is being applied by the manufacturers in the form of reduced financing and insurance rates in deferred payment transactions.

Closed Car Production

As is normal for this season, the production of closed cars is gaining at the expense of open models. But the seasonal trend is accentuated by the price reductions of the last six weeks, which have mainly affected closed cars, thus further reducing the price differential between the two classes. From a competitive standpoint, the reductions have had little effect, since most of the large-volume producers have maintained their relative standing as to prices.

Accessory and equipment makers are sharing in the general activity, with, of course, the body builders, and the manufacturers of sheet steel and body hardware, somewhat ahead of those whose products are used in quantities that do not vary with the body type under production. Tire manufacturers, despite the higher prices made effective this summer, are producing at the highest rate for the season that they have ever attained.

Used Car Situation

The used car market was dealt something of a blow by the price reductions, and some losses and a certain degree of stock increase has been the result, but this appears to be a temporary situation that will correct itself if the dealers maintain sound merchandising methods.

GRAHAM TRUCK REDUCTION

NEW YORK, Sept. 9—Announcement of a reduction of $100 in the price of Graham Bros.' one-ton truck, effective yesterday, has been received by representatives of Dodge Bros.

Annual Machine Tool Meeting Convenes

Addresses by Men Prominent in the Industry Delivered in New Haven

NEW HAVEN, Sept. 9—The annual machine tool exhibition held under the joint auspices of the New Haven Section of the A. S. M. E., Yale University, and the New Haven Chamber of Commerce, opened in the Mason Laboratory here last evening. There are 59 exhibitors, showing the products of 110 makers in the machine tool industry. All of the four floors of the building are crowded with exhibits, and, as most of the machines are being demonstrated, the exhibition presents a lively scene. The attendance on the first two days was all that could be desired.

In connection with the exhibition a meeting is being held by the local section of the A. S. M. E., marked by a number of technical sessions and visits to local manufacturing plants. On Wednesday morning the A. S. M. E. Special Research Committee on Metal Springs, of which Joseph K. Wood is chairman, held a meeting. At the afternoon session a paper on "Centerless Grinding" was presented by W. J. Peets, factory methods engineer of the Singer Mfg. Co., Elizabethport, N. J. This session was held in the lecture room of the Dunham Laboratory of Electrical Engineering and was well attended. An abstract of this paper and a review of the discussion will be printed in the next issue of AUTOMOTIVE INDUSTRIES.

Subjects Discussed

At the evening session on Wednesday, held at the Lamson Lyceum, O. B. Iles, president of the National Machine Tool Builders Association, and of the International Machine Tool Co., of Indianapolis, addressed the Society on "The Future of the Machine Tool Industry." He said that at the present time the atmosphere, the feeling with respect to the future, was one of more confidence than at any time during the last five years.

W. B. Stout was scheduled to present a paper on "All Metal Airplanes," but he was called to Los Angeles at the last moment and the paper was presented in abstract form by G. H. Hoppin of the Stout Metal Airplane Co. This paper was illustrated by numerous lantern slides, some of historical airplanes and others of recent machines of the Stout Company, as well as by moving pictures of the operations of the Ford inter-plant air service.

W. H. Rastall, Chief of the Industrial Machinery Division, Bureau of Foreign and Domestic Commerce, gave a talk on the "Foreign Trade Outlook in the Machine Tool Field."

Another technical session is scheduled for this afternoon and a session on shop training methods for tomorrow.

Big Tire Fabric Plant Under Way in Georgia

ATLANTA, Sept. 10—The Southern Brighton Mills Co. now has under way at Shannon, Ga., near Rome, a plant for the manufacture of cord fabric for use in the making of cord tires that, when completed, will be one of the largest mills of this nature in the South. The total cost of the project is estimated at $1,750,000, and plans also include the construction of a mill village for operatives of about 100 dwellings, further increasing the total cost of the development.

A large part of the mill's output has already been taken on a contract basis by some of the larger tire manufacturers at Akron, Ohio, officials of the company advise.

With the completion of this mill toward the end of the year the State of Georgia will become the largest producer of automobile tire fabric in the Union, as within the past three or four years there have been several other large mills of this type established in this State.

Overland Four Sedan Now Priced at $595

TOLEDO, OHIO, Sept. 10—A sixty-dollar cut on the Overland four-cylinder standard sedan, a two-door, five-passenger model, has been announced by Willys-Overland, Inc. This reduction makes the price on this model $595, which is but $15 more than the Ford Tudor job.

A number of improvements have been incorporated in this model, including a one-piece, ventilating windshield and wider and deeper seats and cushions. Radiator shell and headlamp rims may also be had with nickel finish.

Edgar S. Gorrell Goes to Stutz Co.

Leaves Nordyke and Marmon to Become Vice-President Under Moskovics

NEW YORK, Sept. 8—The election of Edgar S. Gorrell as vice-president of the Stutz Motor Car Co. of America, Inc., was announced today by E. V. R. Thayer, chairman of the board of directors. Mr. Gorrell will be made a member of the board at an early date. He resigned as vice-president of the Nordyke & Marmon Co. to take his new post. Mr. Gorrell's career in business marks him as one of the leading figures in the automobile industry, said Mr. Thayer.

Commenting on the appointment, Fred E. Moskovics, president of the Stutz company, said:

"We have been so impressed by his record that the opportunities he sees in this new connection come as a source of gratification to the entire organization and mean another distinct advance in the development of this institution."

Mr. Gorrell is a graduate of West Point and of the Massachusetts Institute of Technology. He was the youngest colonel in the army and one of the flyers lost in the Mexican Expedition. He was chief of staff of the air service during the World War, receiving American, British and French decorations. Entering the automobile business after the war, he was notably successful as a distributor on the Pacific Coast and in New England. His knowledge of dealers' problems led to his connection with the Marmon sales department, where he earned a promotion to vice-president.

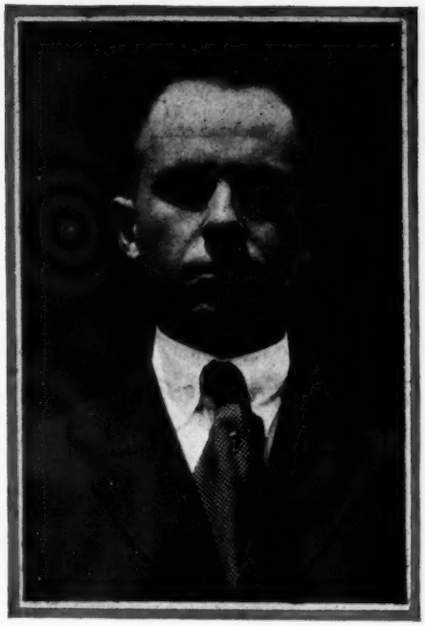
Ford Interests Mount to More Than a Billion

LANSING, MICH., Sept. 8—Assets of Henry Ford and of the companies in which he is interested are estimated by the State corporation division to be approximately one billion dollars.

The assets of the Ford Motor Company alone are $644,624,468, according to its annual report made to the corporation division. Reports from the other companies in which Mr. Ford has interests, have not been made.

In the statement of the Ford Motor Company which was of Dec. 31, cash on hand, patent rights, formulas, good will and the value of credits was listed at $265,723,525; stocks and bonds, $55,070,305; supplies, $95,254,936; prepaid expenses, $1,455,082; fixed assets, less depreciation and amortization, $227,126,617.

Liabilities were given as: Accounts payable, $33,116,229; employees investment, $23,459,888; expenses and taxes payable, $28,122,714; amortization of patents, $185,138; capital stock, $17,264,500; surplus, $542,473,496.



Edgar S. Gorrell

New Mexican Roads Help Car Trade

DALLAS, TEXAS, Sept. 9—The number of automobiles in Mexico will be increased 100 per cent in the next twelve months and the automotive business will be one of the best in the Republic, according to Mexican business men who have visited Texas recently.

This increase in automobile business is due to the highway building program now being carried out, it is said. Mexico is spending $40,000,000 for highways in the next few months. Mexican business men say $40,000,000 for roads would not mean so much in the United States where labor and material are high. In Mexico, however, labor is about 50 cents a day and the material free. The road building machinery is now en route for the border and construction will begin immediately. One paved road is to connect Mexico City with Laredo, a distance of 600 miles. Another probably will connect Mexico City with Juarez, a distance of 900 miles. Still others will connect the capital with Vera Cruz, Tampico on the Gulf and Guadalajara on the Pacific. Some 2000 miles of graveled roads from the main cities of the Republic to vital points will complete the system of highways planned for immediate construction.

OVERLAND MODEL FOR EXPORT

TOLEDO, Sept. 8—The Willys-Overland Co. is producing a Model 93 six-cylinder Overland with touring body for export shipment. The first cars have not yet been put on sale abroad, but they have already been in production for several weeks. The body is a two-tone finish, with leather upholstery and, in other respects, is the same as other Six models. The Standard and de Luxe types are both going into export.

Dealer Net Profits Increase Slightly

N. A. D. A. Assigns Reasons for Growing Costs of Making Car Sales

ST. LOUIS, Sept. 9—Automobile dealer net profits showed an increase of 4-10 of 1 per cent, as a National average for 1924, says a bulletin of the National Automobile Dealers Association. This increase in net profit was due almost entirely to the reduction in used car losses in 1924. In effecting this increase in the total net profit, it was noticeable that the cost of doing business had risen over the level of 1923.

Closer buying of used cars, a greater knowledge of the used car market, a longer time and greater expense in selling new cars, an increase in advertising costs—all were a part of the increased cost of making car sales. The consequent reduction in used car losses had the substantial result of increasing net profits.

The average net profit actually recorded for all automobile dealers in 1924 was 3.4 per cent on the total sales volume. This is compared with 3 per cent recorded in 1923, which was an increase over 1922. The amount of net profit which the automobile dealer earns on his total sales' volume has been very much inflated in the public mind, National Association executives assert. For more than three years the National Association has been carrying on a consistent campaign to arouse the automobile business to the necessity for the automobile dealer to realize a 5 per cent net profit on his sales' volume, in order to justify good business men remaining in the automobile retail business. In one certain line of automobiles, at which the public looked as one of immense profit for the dealers, only ten dealers made a net profit equal to 5 per cent in 1923. In 1924 that line had forty-one dealers with a net profit up to the 5 per cent goal. That line of cars has more than 1000 dealers.

Used car losses in 1923 were equal to 9 cents per dollar of car sales' volume. This was reduced to 8.2 cents per dollar of car sales' volume for 1924.

HARDWOOD MARKET IMPROVES

MEMPHIS, TENN., Sept. 9—Hardwood market conditions here have reversed themselves in the last fortnight. Mills that closed down are beginning to resume, prices have shot up several dollars on the thousand. Oak, gum, poplar, ash, hickory and other items show considerably better demand, some grades better than others, but a good improvement all up and down the line. Some of the large hardwood interests of this city are building railroads to timber tracts in Mississippi, and many of them are installing mill improvements preparatory for Autumn and Winter.

Detroit Sales in Seasonable Decline

New Cars Delivered in August Totaled 1767 Less Than July

DETROIT, Sept. 9—New passenger car sales for Wayne county during the month of August were approximately 1767 less than for July, according to the latest and most authentic figures available. The sale of closed models of all types bettered those of the open type by more than five to one. August, 1924, was surpassed by 1736.

Only eight of the 35 companies taken into consideration showed an increase in sales for August over July, some showing but a two and three car gain.

Buick led the entire field in the number of sales, selling 64 open cars and 1087 closed models outselling Ford by 134. This may be accounted for by the introduction of the new model Buicks and the fact that it was generally known that Ford was to bring out improvements in his present cars. Ford showed a loss in Wayne county alone of 2036 cars as compared to July.

A comparison of the figures of the field as a whole show that the sales are on the decline and that the increase this month can be attributed to the new models. Ford is almost certain to sell more than in July when sales for the county reached 3053. If this is true, then September sales will be larger than August.

Government Prepares Specifications Book

WASHINGTON, Sept. 9—The National Directory of Commodity Specifications, to be issued by the Bureau of Standards of the Department of Commerce, is on the press and will be ready for distribution on or about Sept. 21.

This directory contains in convenient form information regarding the best known specifications for more than six thousand commodities. The book tells not only what specifications are in general use but also by whom they were prepared and where copies can be obtained.

Increase Power Rating of Massachusetts Cars

BOSTON, Sept. 9—By revising the horsepower rating of motor cars upward Massachusetts expects to receive $500,000 more from the motorists next year when they go to register certain types of cars, it was brought out at a hearing at the State House last week by Commissioner William F. Williams, and Associate Commissioner Frank D. Lyman, of the Public Works Department.

Commissioner Williams said that the old horsepower formula never had been adopted by any motor organization and it did not fit present conditions. He said he secured two engineers to work out a new formula based upon a speed of some 35 miles an hour. Through his revision a number of cars are thrown from the 20 horsepower class into the 30 and others from the 30 into the 40 and that automatically tacks on $5 or $10 more for a registration tax. The smaller cars are not included, but as they were jumped 100 per cent some time ago when the minimum tax was lifted from $5 to $10 they did not escape.

Prospects in Australia Found Especially Good

FORD CITY, ONT., Sept. 10—Australia, due to several years of good crops and the prospects for the continuance of this prosperity is a favorable market for the automotive manufacturer, P. W. Grandjean, secretary and assistant treasurer of the Ford Motor Company of Canada, Ltd., said today. Mr. Grandjean has just returned to Ford City after a nine months' visit to Australia during which time he covered every part of the commonwealth, totaling 50,000 miles in all.

Unlike the American motorists, who prefer to ride in the enclosed cars, the Australian owner favors the open type, roadster and touring, and does his riding with the tops down, much like the motorist in Great Britain and on the Continent, Mr. Grandjean said. However, the time is coming when closed models will find favor in Australia but the evolution will not be quite as rapid as in the United States and Canada.

Speaking of the improved Ford models, Mr. Grandjean said re-designed Ford cars made their appearance in Australia Sept. 1 and were especially adapted to that country. One of the most hopeful signs for the automotive manufacturer in Australia is the trend for good roads. This movement is making much headway and is receiving encouragement from all classes in Australia. With the increase in good roads, the sales of automobiles can be expected to show corresponding increases.

NEW ENGLAND BUS LINES

BOSTON, Sept. 9—The New York, New Haven & Hartford controls only one bus line to date, which is in Connecticut, but it is now planning to operate between Providence and this city and Providence and Fall River. To this end, it has formed the New England Transportation Co., a $1,000,000 Massachusetts corporation, with railroad men as officers, and has bought thirty-eight buses. Conferences are under way to take over the inter-State bus line between Fall River and Providence and the Dreamwold line from Boston to Newport has petitions in for permits in many places in Southern New England. The Boston Elevated Railroad owns its own buses, feeding to its lines all over Boston and suburbs. The Boston & Maine Transportation Co. is nearly all owned by Homer Loring.

Business in Brief

Written exclusively for* AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Sept. 10.—Business last week was somewhat under the influence of the approaching holiday. Another restraining factor was the reappearance of extreme heat and drought in some sections of the Middle West and South. Commodity prices in general turned upward after three weeks of continuous decline.

Pig iron production last month is estimated at 2,704,476 tons, comparing with 2,664,024 tons in July and 1,887,145 in August last year. The average daily output of 87,241 tons compares with 85,936 tons in the preceding month and 60,875 a year earlier.

Another high record for the year was made by car loadings in the week ended August 22, the total being 1,080,107, as against 1,064,793 in the preceding week and 982,670 in the corresponding period last year. Net operating income from Class 1 railroads in July amounted to $99,462,735, as compared with $74,368,289 in July, 1924.

Business failures reported to R. G. Dun & Co. for the month of August numbered 1513, as compared with 1685 in July and 1520 in August last year. This is the smallest total reported since September, 1924.

Bank clearings in principal cities last month were smaller than any previous total this year with the exception of that for February, but were larger than any other August figure on record. Bank debits to individual accounts reported to the Federal Reserve Board for the week ended September 2 were 6.3 per cent above the total for the preceding week and 28.2 per cent above that for the corresponding period of last year.

Fisher's index of wholesale commodity prices stood at 158.4 last week, compared with 157.3 in the preceding week and 161.4 four weeks earlier. Dun's monthly index reflected a decline of 1¼ per cent, and Bradstreet's a decline of 1⅛ per cent during August.

Earning assets of the Federal Reserve banks declined only $200,000 during the week ended September 2, decreases of $2,800,000 in discounts and $6,000,000 in Government securities being approximately offset by an increase of $11,600,000 in open market purchases. The circulation of Federal Reserve notes increased $21,800,000 and total reserves $10,400,000, while total deposits declined $800,000. The reserve ratio declined from 75.0 to 74.8 per cent.

Increased firmness appeared last week in rates on commercial paper, which rose to 4½ per cent. Call and time loans were unchanged at 4 to 4½ per cent and 4¼ to 4¾ per cent.

Sees No Tire Price Drop During 1925

Lists Now Based on Costs of Crude Under Market, Says Rockhill

AKRON, Sept. 10—There is little hope of a decline in tire prices during 1925, despite a drop of about 40 cents in the crude rubber market since July, according to the statement issued today by L. C. Rockhill, sales manager of the Goodyear Tire & Rubber Co.

The reason is that tire prices have never gone up in proportion to the spectacular rise in the cost of crude rubber, he points out, and present tire prices are based on rubber values considerably under the present market. Said Mr. Rockhill:

Although rubber reached $1.21 a pound in July, this had practically nothing to do with present tire prices, because very little rubber was bought by important manufacturers at this price. If rubber at this cost had entered into production of tires, tire prices would be a lot higher than they are now.

Because the larger manufacturers buy their raw material requirements eight or nine months in advance, present tire prices are based on rubber bought at less than 70 cents—the low figure reached during August. If the price of rubber was maintained around 70 cents a pound permanently, tire prices would have to be advanced again, after present stocks of lower priced rubber were exhausted.

With a reduction in production and inventories in the fall, plus an additional release of 10 per cent more rubber in November under the Stephenson act, there is some hope for lower rubber and tire prices in 1926, but this relief will not come soon enough to have any effect for some months to come.

Occupy New Mack Los Angeles Home

LOS ANGELES, Sept. 9—The new home of the Mack-International Motor Truck Corp. in Los Angeles, which was recently occupied, is one of the largest, most modernly and completely equipped buildings in the United States devoted to the sale and service of commercial motor vehicles. The plant is fully two blocks in length, all enclosed, and it represents an investment of approximately $1,000,000.

The ground area covered by the new building is three and one-half acres and the total floor space is more than five acres. The salesroom floor is 160 feet long and has a depth of 57 feet. A portable screen of lattice work separates the used truck display from the new truck department. The screen is in sections and can be placed wherever desired, extending or reducing the area to meet the requirements. A unique feature, which is original and exclusive with the building, is the inside court, which is 125 feet by 100 feet in size.

The spacious shop has many points of unusual interest, particularly the type of construction of the repair pits. The pit proper is almost 400 feet long and nine feet wide, built of concrete. Access is from ramps at each end. A continuous bench 30 inches wide runs the full length. The bottom of the pit is four feet below floor level. Daylight facilities are provided by means of windows which extend to within 18 inches of the top of the bench. At the floor level on the side opposite the window are 14 bays each 34 feet wide. Each bay will accommodate two trucks and has a drift from the main pit five feet wide under each.

In front of each bay is a board runway 12 inches higher than the floor level thereby affording five feet of headroom clearance beneath the vehicle. This makes it possible for a mechanic to do his work standing upright. At the back of each runway is a bench for hand tools. A pipe railing incloses each bay and there is a stairway on both sides to the floor level.

Buy Westcott Parts, Tools and Good Will

SPRINGFIELD, O., Sept. 8—A deal has been closed by which Jack Andrews, who represents Chicago interests, has purchased the good will, patents, dies, tools and cars on hand, also material from the Westcott Motor Car Co. through Richard M. Rodgers, who recently acquired this property from Receiver J. M. Rehe. The purchase price has not been made public.

Louis A. Miller, general manager for Warshawsky & Co., 1915 South State Street, Chicago, negotiated the purchase. He states that those he represents may manufacture 100 or 200 Westcott cars at the local plant. Relative to the future he says plans have not been formulated, except that a service department will be maintained in Springfield for the benefit of the Westcott car owners. The present supply of Westcott cars and material will be liquidated.

The plant of the Westcott Motor Car Co. was purchased sometime ago at receiver's sale by a syndicate of local men, represented by J. B. Cartmell, Arthur R. Hill and George Cugley of The Buckeye Incubator Co. They have installed three new industries in the large building. One of these has started the manufacture of stabilizers.

SINGER'S INCREASED PROFITS

LONDON, ENGLAND, Aug. 28 (*by mail*)—Further increased profits are shown by the accounts of the Singer Motor Co. for the year ended July 31 last. The following comparative figures indicate the expansion that has occurred in the last three years:

	1924-25	1923-24	1922-23
Net profits	£91,021	£70,445	£37,269
Brought forward	49,675	30,235	26,927
Dividend	22½%	20%	12½%
To income tax reserve	13,000	.....	.....
To general reserve	55,000	10,000	10,000
To properties reserve	.....	10,000	5,000
Carried forward	30,441	49,675	30,235

Howe in England on Bus Business

Must Accept Buffalo Nickel Fare Contract by Sept. 19—Production Started

BUFFALO, Sept. 9—Ernest M. Howe, president of the Gray Manufacturing Co. of Detroit, is now in England on business connected with the inauguration in Buffalo of his five-cent bus service. Commissioner William F. Schwartz was notified in a letter from Howe's atorneys.

The details of Howe's purpose in visiting England are said to be in connection with procuring electrical equipment for the English type Tilling-Stevens gas-electric buses, which his company is manufacturing in Detroit. He is expected to return to Buffalo late in September.

Planning Production

Howe has not yet made formal acceptance of the contract with him, which the Council approved, and which he must accept within thirty days from Aug. 19. His attorneys may send the formal letter of acceptance if he does not return in time. Before leaving for England, Howe said that manufacture of the buses was under way at the Gray plant and that the company would be turning out four a day by Jan. 10. Buffalo will have its first view of the novel vehicle about Sept. 20. It remains for Howe to gain the Public Service Commission's certificate of convenience and necessity before he can operate his lines in Buffalo.

Gray Manufacturing Co. to Exhibit Bus Designs

DETROIT, Sept. 7—Four gas electric buses of the Tilling-Stevens design are being built here at the plant of the Gray Manufacturing Co. to be put on exhibition at the American Electric Railway Association Show which will be held at Atlantic City, starting Oct. 5.

Three of the buses being built are of the two-deck, the single deck with a seating capacity for twenty-nine persons and the touring coach which seats twenty-seven. The four buses being built will have the chassis only and will be exhibited in that manner. With the exception of the electrical transmission, which is being imported, the bus is strictly an American product, being built from standard parts built to the company specifications.

Under present plans of the company, the construction of buses will be started immediately after the Atlantic City convention.

The primary motive power which is being used is a four- or six-cylinder Waukesha gasoline motor, coupled through a spring drive to an electric motor.

Strip Steel Demand is Well Maintained

Otherwise Steel Market Is Quiet and Demand Is for Late September Delivery

NEW YORK, Sept. 10—Resumption of business in the steel market following the Labor holiday was not attended by any marked change from the conditions which prevailed throughout last month. Automotive demand is largely for shipment in the second half of September, although some tentative inquiries for more representative tonnages to be shipped in October are in the market.

The tangible net result of the anthracite coal strike so far has been an advance of 50c. per ton in the price of Connellsville coke. Most of the blast furnaces are protected by contracts for their requirements over the remainder of the year, and the leading steel-making interest is a producer of Connellsville coke. Foundry coke is up 25c. a ton, but demand has hardly been accelerated by the rise.

While so far the strike has virtually been without any effect on the steel market, it has strengthened pig iron prices. These are holding firm in the absence of corresponding support from buyers, and largely so because of the coke market's tendency, although, of course, anticipation of an early buying movement is also a factor.

Interest In Unfilled Orders

More than usual interest is displayed in the Corporation's unfilled tonnage statement to be made public this afternoon. The Corporation continues to operate at a slightly higher rate of capacity than the industry as a whole, and its turning the corner would naturally be a constructive market factor. Demand for cold-rolled strip steel from automotive consumers is fairly well maintained. Some purchasing agents have been seeking concessions, but most of the Mahoning Valley mills seem disposed to maintain the 3.75c. level. The scrap market, frequently looked to for barometrical indications of the steel market's course, is once more a bullish affair, but, like most of the indications by which market forecasters are guided, the scrap market quite frequently proves a disappointment.

Largely Single Car Buying

Pig Iron.—Automotive foundries are apparently still well supplied, and what buying there is seems to be largely of a single car character.

Aluminum.—Conditions remain entirely unchanged. The sole domestic producer apparently meets with no resistance in marketing his production at the prices that have obtained throughout the year, and importers find it equally easy to dispose of all the metal that is allotted to them by their foreign purveyors. As previously pointed out, any change, if it does come, will be dictated by conditions in the copper market, provided the price of that competitive metal is raised sufficiently high.

Copper.—Producers are striving with might and main to put the market on a 15c. basis. The bear party in London has, apparently, been routed for the time being.

Tin.—The London market is unsettled. American consumers appear to be holding aloof.

Lead.—While paucity of supplies seems little relieved, price levels are slightly more rational, and there is more accord between leading producers' prices and the outside market.

Zinc.—Producers are seemingly not eager to sell at present price levels, and are holding for an advance. Galvanizers and brass makers are covering current needs only, pending market developments.

REPORT BIG DEMAND FOR NEW FORD CARS

DETROIT, Sept. 9—Since the announcement of the changes in the Roadster, Touring, Tudor, Fordor and Coupe models by the Ford Motor Co., orders have been coming in at the rate of slightly more than 10,000 a day, it was said at the factory today.

There are now on the company's books more than 100,000 orders with additional orders coming in faster than ever before in the history of the company. While no effort has been made to segregate the orders as to cars, the orders are about evenly divided. There is a strong trend towards the Coupe and the Roadster.

Reports available at the Ford Motor Company of Canada, Ltd., are much the same. Orders there have been coming in at the same rate and will tax the company to the utmost to catch up with orders which have already been secured.

Miller Warns Against Show Plan in Berlin

WASHINGTON, Sept. 10—A cable to the Automotive Division of the Department of Commerce from Assistant Commercial Attaché Douglas Miller at Berlin advises that American automobile manufacturers be warned against participation in the International Berlin Show planned by several German representatives.

The proposed show, according to the cable, is to be simultaneous with the German manufacturers' show on November 26. The reason given for this warning is that the floor space, finances, advertising and preparations are said to be inadequate for a successful exhibition.

State Files Brief in Chrysler Matter

Denies Federal Court Power to Enjoin Insurance Chief and Asks Dismissal

NEW YORK, Sept. 10—That Federal courts have no right to enjoin State authorities from protecting the people from "compulsory, unsafe, unsound wildcast insurance" is set forth in a brief filed in the United States District Court here, in behalf of State Attorney General Albert Ottinger, and in conjunction with the temporary injunction, granted by that court, and restraining James A. Beha, State Commissioner of Insurance, from interfering with the Chrysler automobile insurance plan. The New York Fire Insurance Rating Organization has joined with the Attorney General in asking the court to dismiss the suit.

The brief asserts that the State cannot be enjoined by the Federal court from carrying out State statutes covering insurance companies doing business inside the State; that the Commissioner of Insurance has power to revoke the license of any insurance company for infringing the State insurance statutes; that the company may have such decision reviewed by the State Supreme Court; but that the United States Supreme Court has held repeatedly that insurance is not a matter of interstate commerce, but a business which each State may regulate within its borders.

The court's decision on the application for dismissal is awaited in several other States where similar injunctions have been obtained.

BRAZIL TRADE APATHETIC

WASHINGTON, Sept. 9—Consular advices to the Automotive Division of the Department of Commerce from Brazil state automobile and accessory dealers there are apathetic due to declining market and necessity of price cutting, which is very unprofitable to dealers with stocks purchased at lower exchange. Sales are reported greatly reduced due to the tendency of the public to await further possible reductions.

OLDS ON OVERTIME

LANSING, Sept. 10—With actual deliveries to passenger car purchasers equaling factory production, every department of the Olds Motor Works has been placed on overtime in order to step up production to meet the demand for the new series D car recently announced.

Production schedules for September call for 5000 sedans and coaches alone. This number may be increased if production changes now contemplated go through. Reports from dealers located in various sections of the country say that cars are being sold as fast as received.

Parts Makers See Big Business Ahead

Members of M. A. M. A. Say That Fourth Quarter Will Be Unusually Active

NEW YORK, Sept. 10—Preliminary returns from a special questionnaire sent out by the Motor and Accessory Manufacturers Association indicate that members are expecting a volume of business in the fourth quarter of 1925 that will exceed by a considerable margin the turnover during the corresponding period of last year.

Reports on current business from members of the association tend to show that production and sales are well above normal for this time of year. The returns, however, are not yet complete enough to determine whether August business was in excess of July.

News from the automobile factories continues to reveal unusually prosperous conditions.

RETURNS TO HOLT TRACTOR

PEORIA, ILL., Sept. 10—Leonard D'Ooge, associated with the Holt Tractor Company until he resigned two years ago to become secretary of the Pekin Association of Commerce, has returned to the Holt plant, which is now operating as the Caterpillar Tractor Co. Mr. D'Ooge is assistant under M. M. Baker, director of the sales departments.

DIVIDENDS DECLARED

Reo Motor Co. has declared a quarterly dividend of 20 cents, and extra of 30 cents, payable Oct. 1 to holders of record of Sept. 15.

Mack Trucks, Inc., has declared a quarterly dividend of $1.50 on common and $1.75 each on first and second preferred, payable Sept. 30 to holders of record of Sept. 15.

Scott Goes with Flint

FLINT, MICH., Sept. 8—The announcement is made of the appointment of George R. Scott as assistant general manager of the Flint Motor Co. He also becomes a member of the board of directors and of the executive committee.

This appointment has just been made public by R. H. Mulch, recently elected vice-president and general manager.

Mr. Scott spent eight years with General Motors as factory manager, first with the Chevrolet New York plant and later in charge of Chevrolet production at Oakland, Cal., for five years. In 1921 he became affiliated with Durant interests at the Oakland, Cal., plant, where he has been since, first in charge of production and later as assistant general manager. As assistant general manager of the Flint Motor Co., Mr. Scott will be responsible for the production and quality of the product.

FRANCE MAY USE SUBWAY GARAGES

WASHINGTON, Sept. 9—Plans for construction of underground garages in France are being considered by the Municipal Council in Paris to reduce congestion of street traffic, according to the Automotive Division of the Department of Commerce. This proposal has been handed over to a special commission for examination and may be regarded as an important contribution toward the ultimate improvement of Paris street traffic.

TIME RECORD LOWERED

DENVER, Sept. 9—The time record for the Denver to Lookout Mountain and circle trip has been lowered again, this time by Floyd Clymer, well known Denver driver and inventor, in an Oldsmobile Six, Series D. The trip was made in the early morning to avoid traffic, and was unique in that Clymer was preceded by a motorcycle rider to clear the track, and followed by a newspaper reporter in an aeroplane. Golden, eleven miles distant from Denver, was reached in eleven minutes, and the top of Lookout Mountain, nine miles farther, was reached in an additional eleven minutes, making a total of twenty miles in twenty-two minutes. The balance of the trip through the mountains to Evergreen and back to Denver added thirty-seven miles, and brought the average time for the entire trip of fifty-seven miles to 44.91 miles per hour. There are a total of four hundred and twelve turns on this trip, and many sharp, steep climbs. The former record was established last spring by Cannonball Baker.

B. W. M. HANSON

HARTFORD, CONN., Sept. 6—Bengt W. M. Hanson, president of the Hanson & Whitney Machine Co., Hartford, and inventor and mechanical engineer of wide repute in the machine tool industry, died here today. He had been in failing health for several years, but attended to his duties until a few weeks ago.

Mr. Hanson was born in Sweden in 1866. Upon coming to America in 1890 he held various engineering posts, and he served with distinction as a civilian member of the machine gun board of the War Department. In 1920 he became associated with Clarence E. Whitney in the machine tool industry, the various taps, gages, tools and processes in their production by the company being his inventions.

JORDAN TO ANNOUNCE NEW LINE

CLEVELAND, Sept. 9—The Jordan Motor Car Co. is shortly to announce a new Line Eight series of motor cars, according to officials of the company here.

Ford's Help Sought in Air Mail Plans

Postmaster General New Discusses Possibilites of Venture

DETROIT, Sept. 8—Detroit is to be included in the itinerary of the air mail service planes, Postmaster General Harry S. New assured local post office officials today after a conference with Henry Ford in which the subject of the air mail was thoroughly discussed. But as for Mr. Ford building the planes that would carry the mail or the Ford planes now operating between Cleveland, Chicago and Detroit, Mr. New said that no agreement had been reached. Under the law, Mr. New said, Mr. Ford would have to engage in competitive bidding before his planes could carry the mail. In the past it has been against the policy of the Ford company to sell air transportation.

To Advise on Type of Plane

The greatest need of the air mail service today, Mr. New stated, was a plane that could fill satisfactorily all the requirements of carrying mail. It is here that the help of Mr. Ford is needed, he said.

"In my conference with Mr. Ford and other officials of the Ford Motor Company, we discussed the need of an air mail service for Detroit," said Mr. New. "Mr. Ford was enthusiastic over the project, and I am convinced that he will lend his aid to our plans for this city.

"Detroit is entitled to share in the benefits of an air mail service. It has excellent facilities for the rapid dispatch of mail by air, and there is no better landing field in the country than the one owned by Mr. Ford."

It was learned that, if the Government asks for bids to cover this service, Mr. Ford will bid, but no definite agreement between him and the Government has been reached.

Cadillac Sales Increase

DETROIT, Sept. 9—Sales of the new model Cadillac during the first three weeks following its announcement were 51 per cent higher than those during the first three weeks following the introduction of the 1-63 two years ago, and 70 per cent higher than during the corresponding three weeks of 1924. Retail sales each week since the new car's announcement have also been the largest in the company's history.

Velie Motors Active

MOLINE, ILL., Sept. 8—Velie Motors Corp. reports shipments during August double those of the corresponding month of last year. The Velie factory has been working overtime. In September a new three passenger coupe will be announced.

Americans Place in Italian Grand Prix

Milton and De Paolo Secure Fourth and Fifth Places —Italian Wins

MILAN, ITALY, Sept. 6—Brilliperi on an Alfa Romeo racing car today won the Italian Grand Prix Race at an average speed of 94.76 m.p.h. Campari on another Alfa Romeo finished second and Constantini on a 91.5 cu. in. Bugatti was third. Milton, driving one of the two Duesenberg cars in the race, finished fourth; Peter De Paolo, on another Alfa Romeo was fifth, and Bugattis took sixth, seventh and eighth places.

Peter Kreiss, driving the second Duesenberg, secured the lead during the second lap. While he was in the lead he took a turn too fast, owing, it was said, to the fact that he could not disengage his clutch as he approached the curve; his car skidded badly and finally toppled over, fortunately without injuring the driver. This put one of the Duesenbergs out of the race while on its third lap.

Alfa Romeos Regain Lead

Milton maintained himself in fourth place for thirteen laps, and overtook De Paolo on the fourteenth lap thus moving up to third position. During the thirtieth lap, Campari and Brilliperi stopped for fuel and tires, and Milton got the lead, which he held until the thirty-ninth lap, when he also had to make a stop for gas and tires.

At this point of the race, the Alfa Romeos got the lead again, and during the following lap Milton, having to stop for twenty minutes in order to replace an oil lead to the camshaft bearing, dropped down to eighth position. Very early in the race the right gear shock absorber broke on Milton's car, making it difficult to hold the road when the tanks were full. After five laps the transmission countershaft broke, and this necessitated running the rest of the race on top gear although the course called for two gear shifts per lap of ten kilometers (6.2 miles). The race proved that the clutches and transmissions on the Duesenberg cars are too weak for racing under European conditions.

Duesenbergs Show Speed

De Paolo, driving one of the Alfa Romeos, never secured the lead, but was in second position for a while. His exhaust pipe dropped off and he was delayed by a loose choke in his carbureter. The Duesenbergs had no engine trouble, while the Alfa Romeos suffered a lot of minor troubles. In practice the Duesenbergs showed the highest speed, but, owing to transmission trouble, they could not prove their worth in the race.

The committee refused to allow the Duesenbergs to start in the race with their original bodies, and this made it necessary to build special single-seated bodies 31 inches wide. The work was done at the Isotta Fraschini plant, which was placed at the disposal of the American team for the purpose. Milton stated that the wider body made no difference in the speed of the cars on the Monza track, but much time was lost in building the bodies.

Fifteen cars started in the race, cars of 122 and 91 cu. in. running together. The Guyot special sleeve valve engine dropped out of the race early, while the Diatto Eight broke its blower. Goux led in the small car class until fifteen miles from the finish, when he was forced out with a broken valve and Constantini took his position.

Times of Leaders

The race was 800 kilometers (497 miles) long and the times of the leaders were as follows—Brilliperi, 5 hrs. 14 min. 33 secs.; Campari, 5 hrs. 35 mins. 30 secs.; Constantini, 5 hrs. 44 mins. 40 secs.; Milton, 5 hrs. 46 mins. 40 secs.; De Paolo, 5 hrs. 48 mins. 10 secs.

In addition to the individual competition, there was a competition by teams, but this proved a walk-over for the Alfa Romeos, as the only competing team, that of the French Delages, was withdrawn shortly before the start.

The race was held in perfect weather and was seen by 130,000 spectators. The technical conclusion from the event is that America secures better engine results with simplified construction, but, owing to lack of road races, is not up in clutch and transmission practice. The Duesenberg machines will probably be shipped home directly.

Automobile Equipment Corp. Declares Dividend

CHICAGO, Sept. 9—Dividends of 8 per cent on the preferred stock and 15 per cent on the common have been announced by the Automobile Equipment Manufacturing Corp., makers of "Balloon Bumpers." The dividends affect stockholders of record July 1.

The plant is making about 100 shipments daily at present, but has recently been enlarged to allow of an output of more than 500 pairs of balloon bumpers daily. The officers of the company are: F. D. Cerf, president of the Stutz Chicago Factory Branch, Inc., president; G. M. Cerf, vice-president, and J. W. Suporter, secretary and general manager.

Fiat Turning Out 150 Cars Daily, Says Report

WASHINGTON, Sept. 9—The Automotive Division of the Commerce Department is informed by consular dispatches from Italy that the Fiat is busier than ever and is declared to be turning out 150 cars daily as compared with an output of 120 reported the latter part of June by the Consul in Turin. According to a Turin business weekly, "L'Informasions Industrials," the rate of production in 1926 is expected to reach 500 cars daily, when work on the new light model 509 really gets under way.

Automotive History Traced in Exhibit

Smithsonian Institution in Washington Opens New Industrial Group

WASHINGTON, Sept. 10—A great collection of automotive parts tracing the life history of the automobile is being assembled at the Smithsonian Institution, Hall of Arts and Industries, here, and has elicited the admiration of automotive engineers who have visited the museum to examine the older cars exhibited there. The collection includes working models showing how every portion of an automobile motor operates, the relationship between parts, and methods of lubrication. It is growing rapidly and officials expect it to be one of the most complete of the industrial groups.

The Autocar Co. has presented to the museum a 1921 model of its four-cylinder truck motor, with cutaway portions and careful labeling so the layman can trace in detail every operation of the motor. The power plant is operated by an electric motor, geared down, with a wall switch so the visitor can operate it himself and stop it at any point for detailed study. This company is also represented by several one-quarter scale truck models.

Outstanding Exhibits

The Ford Motor Co. has presented a full-sized operating model of the Ford ignition system. The model is equipped with an exterior switch so the visitor may operate it.

A working model, driven by a hand crank, of half of a single cylinder of the sleeve valve type has been installed by Willys-Knight.

The Haynes Automobile Co. has installed a six-cylinder engine of the 1914 type, with cutaway sections showing all working parts.

A full-size chassis and motor, with cutaways showing all working parts throughout, has been presented and installed by the Cadillac Motor Car Company.

Historical Section Exhibits

In the historical section of the exhibit is a car constructed by Charles L. Duryea at Springfield, Mass., in 1892. One of the first Cadillacs, a 1903 model, has a single-cylinder engine, of 5 by 5 bore and stroke, mounted horizontally, giving 10 horsepower. Elwood Haynes is represented by a 1 hp. car built at Kokomo, Ind., in 1893-94. A rotating gas engine, used by Stephen M. Balzer in his model, was constructed in 1894. The original Oldsmobile, built in 1896, is one of the interesting exhibits. It has a one-cylinder 6 hp. plant.

What is said to be the first shaft-driven gasoline automobile was that built in 1901, by Louis S. Clarke, former vice-president and consulting engineer of the Autocar Company.

Merger of East and West Companies Near

American Car and Foundry and J. G. Brill with Fageol in Deal

OAKLAND, CAL., Sept. 9—A $10,000,000 corporation with manufacturing plants for motor buses, trucks and engines at five widely-separated cities, is to be the result of the recent purchase of the Hall-Scott Motors, Inc., of Berkeley, Calif., and the virtually concluded negotiations for the purchase of the Fageol Motors Company, of Oakland, Calif., by the American Car and Foundry Company, of New York, and the J. G. Brill Company, of Philadelphia.

According to what amounts to an official announcement of the large combination, the plant of Hall-Scott Motors, Inc., at Berkeley, Calif., is to be enlarged, and devoted to the production of engines for Fageol buses. The plant of the Fageol Motors Company, at Oakland, and the similar plant at Kent, Ohio, are to be enlarged and will continue the production of chassis and bodies for these buses, and for the five capacities of motor trucks now built by Fageol. Bodies for special types of buses on Fageol chassis, equipped with Fageol motors, as well as types of trucks for special purposes, motor vehicles for use on railway rails, and tramway buses, will be built, in part at least, at the plants of the American Car and Foundry Company in New York, and of the Brill interests in Philadelphia.

Capitalization $10,000,000

From a man close to the Fageol and Hall-Scott interests and prominent in the negotiations which resulted in the combination, but who will not allow the use of his name, it is learned that the capitalization of the new corporation will be $10,000,000, and its plant assets will total about $6,000,000 more. It is understood, as a part of the deal that neither Fageol nor the Hall-Scott companies are to lose their identities, and their names will be preserved as at present. The new corporation will be a subsidiary of the American Car and Foundry Company and the J. G. Brill Company, and will consist, primarily, of the plants and assets of the Fageol Motors Company and Hall-Scott Motors, Inc.

Negotiations for both purchases were carried on for the Brill and American Car interests by S. M. Curwen; for Hall-Scott, Inc., by Col. A. V. Hall, and for the Fageol Motors Company by S. H. Bill. It is understood that the price paid for Hall-Scott Motors, Inc., was $5,000,000, of which $4,500,000 was for plant and patents, and $500,000 for good will. The price agreed upon between Mr. Curwen and the directors of the Fageol Motors Company is placed at present appraised value, not yet determined, plus net current assets, and $500,000 good will.

The purchase of Hall-Scott Motors, Inc., has been completed, but the agreement between the directors of the Fageol company and the Brill and American Car interests is dependent on two factors—first the ratification of the deal by a two-thirds vote of the Fageol stockholders, and, second, completion of an appraisal of the Fageol properties by an auditing company of San Francisco, to determine a valuation of the property. It is believed that the price ultimately to be paid for the Fageol interests will be approximately $5,000,000, possibly somewhat less.

On this basis, Fageol common stock will be worth a book value of $2.50 to $3, plus a good-will payment of approximately $2.50 per share, or a total of $5 to $5.50 a share. Under the new plan, preferred stockholders of the Fageol Motors Company will receive preferred stock in the new corporation, par for par, while the common stockholders will receive $3 per share in the new preferred stock and $2 to $2.50 per share in cash. It is also understood that the capitalization of the merger will be of $10,000,000 in preferred and 150,000 shares of no-par-value common stock. This arrangement, however, may be altered later.

Market for Buses Large

The preferred stock in the new subsidiary corporation will be taken largely by the American Car and Foundry Co. and the J. G. Brill Co., in exchange for extensive financing to be done to increase widely the scope of operations for both Fageol Motors Co. and Hall-Scott Motors, Inc. Competition from such corporations as General Motors, Pierce-Arrow and the White Manufacturing Co. in the motor bus and truck field is to be met, and, through the American Car and Brill outlets, auxiliary rail motor buses are to be offered to steam and electric railroads at reduced costs. Electric rail lines, such as the Pacific Electric and the San Francisco-Oakland Railways Co., in Los Angeles and Oakland, respectively, are constantly augmenting their electric car services with buses, as is also the Southern Pacific among steam lines in the West. The New Haven, Boston and Maine, Boston Elevated and Eastern Massachusetts Street Railway are doing the same thing among the Eastern seaboard lines. The market for these urban and suburban motor-bus lines is greater than it ever has been and is constantly expanding, and this condition probably is the real reason underlying the purchase of the Fageol Motors Co. and Hall-Scott Motors, Inc., by two corporations largely engaged in building vehicles for steam and electric transportation.

BLISS OFFICE MOVED

NEW YORK, Sept. 9—E. W. Bliss Co. of Brooklyn, maker of pressed metal machinery, etc., announces that it has moved its Detroit office from the Dime Bank Building to the General Motors Building in that city for the greater convenience of its customers.

FINANCIAL NOTES

Aero Supply Manufacturing Co., Inc.—The New York Curb Market has admitted 25,000 shares of this concern's Class A no par and 38,500 of its Class B no par stock.

Bingham Stamping & Tool Co.—This company, located in Toledo, is building a $30,000 addition to its plant, which increases manufacturing capacity about 25 per cent. Half of the company's output goes into automobiles and the remainder into radio, juvenile vehicles and building construction.

India Tire & Rubber Co.—This company did the greatest business in its history in the first six months of 1925. According to a report issued this week, sales totaled $2,413,734, against $3,103,000 for the entire year of 1924. Net earnings for the first half year were $314,655, or $27.70 a share, after allowance for depreciation and federal taxes. This compares with profits of $303,933 in all of 1924.

The Danville Battery Manufacturing Co.—L. T. Allen, W. T. Gunn, J. E. Epler, J. F. Geddes and H. E. Douglas have organized the Danville Battery Manufacturing Co., with capital stock fixed at $200,000. The new company has taken over the plant, equipment, contracts and patents of the Witwer Battery Co., which suspended a year ago because of insufficient capital. Epler will be general manager. The plant will be opened shortly and will specialize in storage batteries for motor vehicles. It is planned to employ a force which will require a payroll of $90,000 per annum at the outset, and it is said that this will be increased as the business justifies.

The Moto-Meter Co., Inc.—The income account of this company for the eight months ended August 31, 1925, is as follows:

Net Income	$1,260,000
*Earnings per share, Class "A"	3.47
*Earnings per share, Class "B"	2.83

*Based on 200,000 Class "A" and 200,000 Class "B" shares.

NEW STRAIGHT-EIGHT SUNBEAM

LONDON, ENGLAND, Aug. 28 (*by mail*)—Brief particulars are announced today concerning a straight-eight model which is to be offered for 1926 by the Sunbeam Motor Co. It is to be known as 30-90 hp. and has push-rod operated valves, nine-bearing crankshaft, unit construction, plate clutch and four-speed gearset. Half-elliptic springs are fitted in front and cantilevers at the rear, while servo-operated four-wheel brakes will be standard. Two sizes will be offered, a short model (137-in. wheelbase) at £1,050 for the chassis only, and a long model (144-in. wheelbase) at £1,250.

Developments of the Week in Leading Motor Stocks

NEW YORK, Sept. 10—That the credit situation is the dominating factor in the speculative markets was amply demonstrated by the sharp advance in call money rates early in the week with irregularity and weakness in prices on the New York Stock Exchange. All groups came under the general influence of the higher price which banks demanded for credit although the automotive groups generally rebounded more rapidly, once the selling pressure was removed.

There was little of actual news having a specific bearing upon stock prices. Rumor and conjecture again were the predominating forces in speculation. The erratic fluctuation of Chrysler Motors was the result wholly of a technical position in the stock taken by professional speculators. Aggressive strength in Pierce-Arrow was accompanied by a repetition of the various rumors which long have been in circulation regarding this corporation.

Chicago, Cleveland, and Boston have been the interesting centers in the banking situation, and now are joined by New York, where the weekly returns give definite indication of a greater credit strain than previously has been shown. It is probable that another week or ten days will elapse before the curiously complex forces now at work will become fully effective. During the summer, mercantile collections are notoriously slow, but, with the advent of September, these obligations are met. A natural result is a substantial increase in deposits. This is shown notably by the statements of the out-of-town banks since the first of the month.

At this center the banks are accumulating funds in anticipation of income tax payments September 15, on which date Secretary Mellon probably will make an offering of Treasury notes. It seems likely that the policy on this issue will be similar to that employed last March when the banks outside of New York subscribed for the bulk of the issue.

There is evident pressure being brought by the banks to reduce collateral loans, first, to meet the requirements of the crop moving season; second, to meet the increased demand from business, and, third, to provide funds for the Treasury operations.

While the outlook thus would seem to indicate a period of money stringency after the middle of this month, with a resulting effect upon stock prices, there are at least two important announcements in the motor world expected before then. The first of these concerns the actual transfer of Fisher Body Corp. to General Motors, this transfer to be effected upon the basis of an exchange of stock, share for share, according to reports from unusually well-informed quarters. The second has to do with the affairs of the Pierce-Arrow Corp.

None of the tire or accessory stocks has shown special features during the week just past, although pool attempts to simulate an appearance of activity have not been wanting—H. H. S.

GASOLINE CUTS

PEORIA, ILL., Sept. 10—In the wave of price cutting which swept through the Middle West last week, the Larkin Co., mail order distributors of household foods and products, recently launched in the gasoline field locally, cut to 13 cents a gallon with the Sweeney, Shell, Sinclair and other local independents holding at 14. The Indian Refining Company shut up two of its stations when the price fell to 14 a week ago and it is likely other companies will curtail their outlets in this new move. Decatur has been hovering around 16 cents for several days with hope for a 15 cent gas price but Peoria's mail-order firm beat the Decatur autoists to it.

NEW MODEL REPORTED

DETROIT, Sept. 9—Distributors and dealers of Paige and Jewett lines have received information that a new car which may round out the existing lines may be expected about show time. It is thought that the new car will fit into an unoccupied place in the price scale below the present Jewett. No verification is forthcoming from the home office at this time, although officials stated that considerable attention is being devoted to such a move. Several experimental jobs have been on the road, but the status of policies and plans for the moment does not warrant any direct statement of either denial or confirmation.

PERU TRADE REPORT

WASHINGTON, Sept. 9—Peru's automobile trade is affected by restriction in dealers' discounting privileges, the Automotive Division of the Department of Commerce is informed. August imports through Callao were 52 cars, 13 trucks, 1 bus, all but three cars coming from the United States.

SIX WHEEL COMPANY TO BUILD MORE TRUCKS

PHILADELPHIA, Sept. 10—The Six Wheel Co. is preparing to extend its truck building operations, hitherto on a limited scale. The company already has six-wheel buses operating in several large cities. The Pennsylvania & Reading Railroad is studying the six-wheel type vehicle for both passenger and truck haul.

The former manufacturing plant of S. S. Emerson, recently acquired by the company, will be available for the truck building, and a new plant will be erected on a five-acre site. The Six Wheel Co. is a subsidiary of the American Motor Body Corp., of which Charles M. Schwab is chairman. The corporation has sold its Detroit body plant to the Chrysler Corp., as was announced in these columns a week ago.

CANADIAN CAR SHIPMENTS

OTTAWA, Sept. 8—Passenger cars and trucks shipped from Canada in 1924 reached a total of $27,072,960, according to figures released here. Of this amount, the passenger car total was $22,080,799, and the truck $4,992,161. The number of passenger cars shipped was 43,883 and the trucks 12,727.

CHILE BUSINESS STRONG

WASHINGTON, Sept. 9—Early sales of automobiles in Chile, says a cable to the Automotive Division of the Department of Commerce, indicate one of the best years in this industry. "Sales in southern towns and rural districts," continues the cable, "particularly are promising. Movement of low priced cars in Santiago during August less than previous months but largely due to change of lines by one large importer. Medium and high priced cars better than several months. Light trucks continue to do well but medium weight only fair. Accessories slow. Many dealers appear overstocked although retail sales seem satisfactory."

BLACK AND DECKER CUT

TOWSON, MD., Sept. 10—The Black & Decker Manufacturing Co. has announced price reductions on the Black & Decker 8 and 81 portable electric drills.

The No. 8 drill which previously listed for $205 for 110 volts and $200 for 220 or 250 volts, has been reduced to $175 for any voltage. The No. 81 has likewise been reduced so that the price for any voltage is now $195. A reversing switch for either of the above units is furnished at an additional cost of $20.

BUILDING BUS BODIES

MUSKEGON, Sept. 10—The Fitzjohn Manufacturing Co. of this city is rapidly getting into production on a parlor coach type with a seating capacity of 15 passengers exclusive for mounting on the Studebaker Big Six chassis. Additional manufacturing space has been obtained by utilizing the present office space which will be replaced by a new addition, which is being built.

Men of the Industry and What They Are Doing

Taylor Goes to M. I. T.

C. Fayette Taylor, M. E., who has served as chief power plant engineer of the Wright Aeronautical Corp. of Paterson, N. J., for the last three years, has resigned to join the faculty of the Massachusetts Institute of Technology. Since Mr. Taylor's graduation from the Sheffield Scientific School of Yale, he has devoted his entire time to aeronautical engineering, having served with the National Advisory Board and later at McCook Field Experimental Station prior to his association with the Wright company. Mr. Taylor will take up his new duties on Jan. 1, 1926, and will have charge of the research work in connection with aeronautical and automotive power plants.

Arthur Bull Resigns

Arthur A. Bull, who for ten years was Chief Engineer of the Northway division of General Motors Corp., and, since its affiliation with General Motors Truck Co., Chief Engineer of the engine division, announces his resignation.

H. W. Alger Resigns

H. W. Alger, vice-president of the Durant Motor Co. of Michigan and general manager of the company's Lansing plant, has resigned his executive positions with the company, effective Oct. 1.

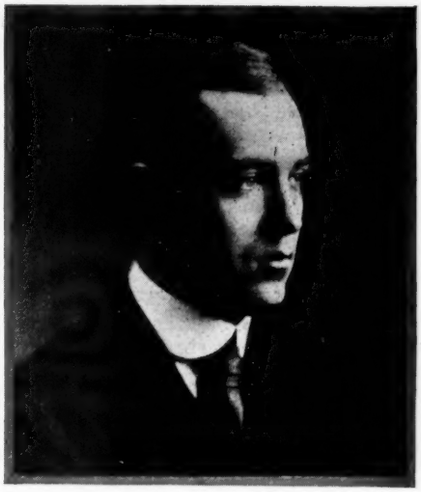
Ford Sends Car on Coast to Coast Trip

FORD CITY, ONT., Sept. 8—On its twenty-first birthday, Ford Motor Co. of Canada, Ltd., has started one of its improved touring cars on a trip that will take it from Halifax to Vancouver. The car is being driven by an employee of the Ford factory, accompanied by a motion picture photographer.

The trip is said to be the first time that any automobile has attempted to drive from coast to coast in Canada under its own power, without entering the United States at any point. The company, it is reported, hopes to attract further attention to the possibilities of a Trans-Canada highway and also to gather information concerning Canada's appeal to motor tourists.

While it is known that roads do not exist in several places, the two men driving the car have been given the use of the permanent way of the Canadian Pacific Railway and will drive over rails on specially flanged wheels only when there is no other road available.

Films will be taken over the entire route and later distributed to officials of communities through which the car passes. A parchment scroll embodying the map of Canada and leaving room for the mayors of the towns through which the car passes to sign will make a permanent and lasting record of the journey.



Robert J. Anderson

Recently Appointed Head of the Metals Division, Kant-Score Piston Co.

CHANGES ANNOUNCED IN MARMON PERSONNEL

INDIANAPOLIS, Sept. 9—G. M. Williams, president of Nordyke & Marmon Co., announces the appointment of Homer McKee as vice-president, succeeding E. S. Gorrell. H. H. Brooks has become director of sales.

Mr. Williams, who came to this concern 18 months ago and who is responsible for the introduction of the new Marmon car, said:

"Mr. McKee, recognized as one of the most seasoned and aggressive merchandisers in the country, will retain the presidency and management of the Homer McKee Co., Inc., of Indianapolis.

"August Marmon sales show an increase of 100 per cent over August of last year."

Babcock Returns East

George D. Babcock, manufacturing executive of the Caterpillar Tractor Co., Peoria, Ill., successor to the Holt plant, has resigned and will return East this month, although his future plans have not been announced. He came here six and a half years ago to take charge of the manufacturing activities of the Holt plant, after occupying a similar position with the Franklin Motor Co.

PLANT ADDITION BEGUN

NEW BRUNSWICK, N. J., Sept. 9—International Motors Company, New Brunswick, N. J., has begun operations on a new addition to its plant. The structure will cost $80,000.

Raskob Back From Europe

John J. Raskob, vice-president of General Motors Corp., returned from Europe Sept. 8 on the White Star liner Majestic.

Lawson With Bendix Brake

O. T. Lawson, formerly with the Trippensee Closed Body Corp., Detroit, has resigned and entered the employ of the Bendix Brake Co., South Bend, Ind., as purchasing manager.

Scott Manager for Packard

R. M. Scott has been appointed foundry manager for the Packard Motor Co., Detroit, succeeding Fred Erb. He was formerly connected with the Cleveland Punch & Shear Works.

John Kelsey Recovers

John Kelsey, president of the Kelsey Wheel Co., has returned to Detroit after having spent five weeks in the Mayo Brothers' Hospital in Rochester, Minn. Mr. Kelsey has recovered from a series of operations.

Hubbard Joins A.S.M.E. Staff

Guy Hubbard, who for ten years has been active in the machine tool field, has joined the staff of the American Society of Mechanical Engineers, with headquarters at their editorial office in New York City.

Argentina Demand for American Cars Firm

WASHINGTON, Sept. 9—The demand for American automobiles in Argentina is being well maintained and with steady exchange, American sales to Argentina should continue for the balance of the year at the high figure maintained thus far, the Automotive Division of the Department of Commerce is informed through cable advices.

Automobile sales during the first eight months were largely in excess of the entire year of 1924 and dealers expect Spring and Summer season will be superior to any previous year. The tendency toward larger cars in Argentina is noticeable.

PRODUCTION SCHEDULE HIGH

EAST MOLINE, ILL., Sept. 10—A production schedule of 1000 engines monthly throughout 1926 is anticipated by L. R. Ruthenberg, general manager of the local unit of the Yellow Sleeve-Valve Engine Works, which is now averaging 500 engines monthly, with night shifts employed in some departments to maintain the schedule. Increased demand for the engines since the General Motors Corporation merger with the Hertz Yellow Cab interests has sped the plant to capacity and further increases.

Proposed G. M. Plan to Absorb Austin

Financial Structure of the British Company and the Reorganization Details

NEW YORK, Sept. 8—In connection with negotiations between General Motors and Austin Motors, Ltd., Alfred P. Sloan, Jr., President, General Motors, states that the Austin company's capital structure at present consists of £1,000,000 of debentures, 250,000 shares of A preference 7 per cent cumulative, 1,000,000 shares of B preference 6 per cent tax-free cumulative, 1,500,000 shares preference ordinary 10 per cent noncumulative, and 600,000 shares of ordinary stock, all of a par value of £1 per share. Cumulative dividends in arrears on the preference shares amount to something between £300,000 and £400,000, and the company's balance sheet, in addition, shows a large deficit. As a preliminary to the carrying through of the plan of acquisition by General Motors, the capital structure of the Austin company will be readjusted by writing down the present outstanding shares so as to cure the balance sheet deficit, following which all of the present shares, including 600,000 shares of ordinary stock, will be converted into one class of stock, in an aggregate amount of 1,637,500 shares of new preference stock of a par value of £1 per share entitled to receive 6½ per cent cumulative dividends, tax free. All prior cumulative dividends in arrears will be wiped out and the new issue of 6½ per cent preference stock will be distributed to the present shareholders on the basis of 19 shillings to each share of the A preference, 14 shillings to each share of B preference, and 6 shillings 8 pence to each share of preferred ordinary and ordinary stock.

New Financing Scheme

General Motors Corp. will subscribe at par to 1,500,000 shares of new ordinary, or common stock, having a par value of £1 per share, payable in cash. Out of the £1,500,000 of cash to be paid into the company, approximately £1,000,000 will be used to redeem all of the debentures at present outstanding, and between £400,000 and £500,000 will be used to take over the net assets and business of General Motors, Ltd., a subsidiary company of General Motors Corp., owning and operating an assembly plant in London. The net cash outlay by General Motors, therefore, will be approximately £1,000,000, or $5,000,000.

Although the Austin company has secured a fairly broad distribution of its product, the company in the past, like many other foreign manufacturers, has not been profitable to its stockholders, although at present it is operating on a very profitable basis. Its production in 1925 is expected to approximate 18,000 cars, consisting of three types of vehicles which range from 7 to 20 h.p.

The consummation of the pending deal is expected to give General Motors Corp. standing in the foreign market as a British manufacturer and to overcome considerable prejudice in the automobile trade throughout Great Britain against imported automotive products. The plan to consolidate the Austin operations with those now carried on in Great Britain by General Motors will result in a considerable reduction in overhead expense, as well as other manufacturing economies, and will afford an opportunity materially to increase distributing facilities in the British market and the British possessions. Thus, there is expected to result a wider sales outlet, affecting both the American product of General Motors and the Austin product, which consists of much lighter vehicles particularly adaptable to the foreign demand, but not in conflict with present General Motors lines.

Profitable to Stockholders

The plan has found favor with the principal stockholders of the Austin company because it places them in position to receive a return on their holdings, which will have preference to any return which may be secured by General Motors from its proposed investment. Officers of General Motors, after a careful survey of the Austin company's plant and business, believe that the profits to be derived in future from same, combined with profits to be derived from continued assembly and sales of General Motors products in England, which latter will be taken over by the Austin company, will show a wide margin over the dividend requirements on the proposed new issue of preference stock of the Austin company.

French Car Exports Show Marked Increase

PARIS, Sept. 8—France exported 26,957 passenger cars, having a value of 923,882,000 francs, in the first six months of 1925. This constitutes a considerable increase over the corresponding period of 1924 and is mainly accounted for by the 2230 cars rushed into Great Britain in the month preceding the application of the 33 1/3 per cent import duty. Following England, the most important client of the French automobile industry was Spain, with 3838 automobiles for the half year. The Belgium Luxemburg Union imported 3114 cars; Algeria took 2504; Switzerland, 1252; and Germany, 1243. All other individual nations imported less than 1000 cars.

The imports for the half year totaled 10,089 passenger cars, valued at 75,266,000 francs.

SHOCK ABSORBER ORDER

ROCKFORD, ILL., Sept. 9—Double shifts will be necessary at the Burd High Compression Ring Co. here, following an order from a large manufacturer for $200,000 worth of shock absorber equipment.

Consider Changes in Gasoline Standards

Committee Appointed to Fix Requirements and Make Report on Motor Fuel

WASHINGTON, Sept. 9—A tentative change in the specification for United States Government motor gasoline, the principal feature of which is the elimination of the initial and end point requirements, has been voted by the technical committee on lubricants and liquid fuels of the Federal Specifications Board, following a meeting held recently, it is announced here.

The change, however, will not be put into effect at present, as the committee feels that it is necessary before so doing to purchase limited amounts of gasoline on the tentative specification for purposes of experimental test. In voting the tentative change the committee was actuated by the consideration that if the gasoline meets the present distillation requirements at the 20 per cent, 50 per cent and 90 per cent points, it should be satisfactory to use. After the new specification has been tried out experimentally for several months the committee will again discuss the question, and if possible come to a final decision in regard to changing the present specification.

The technical committee is composed of representatives of various Government departments, interested in the purchase or investigation of lubricants and liquid fuels, and of representatives of different technical societies and petroleum trade bodies. N. A. C. Smith, petroleum chemist of the Bureau of Mines, is chairman of the committee.

FLINT PRICE CUTS

FLINT, MICH., Sept. 9—The Flint Motor Co. has announced price cuts on its series B-40 models ranging from $100 to $185. A reduction of $250 has also been made on the Model 55 brougham. Prices on other models remain unchanged. Following are the models affected by the cut:

Model	New Price	Old Price
Series B-40		
Touring	$1,185	$1,285
Sedan	1,495	1,680
Brougham	1,575	1,760
Series 55		
Brougham	2,485	2,735

NEW CLEVELAND MODEL

CLEVELAND, Sept. 9—The Cleveland Automobile Co. has announced the addition of a de luxe 5-passenger touring car to its 6-cylinder "31" line. This model, which lists at $1,025, is equipped with front and rear bumpers, hand windshield wiper, trunk and trunk rack, windshield wings, cowl ventilator, rear view mirror, heat indicator, cowl lights and ignition lock.

M.A.M.A. Convention Plans Completed

Talks by Sisson, Proctor and Barber Announced—Session Chairmen Named

NEW YORK, Sept. 9—Additional details of the plans for the convention of the Motor and Accessory Manufacturers Association at Montreal Oct. 7-10, were made known this week by the program committee.

Francis H. Sisson, vice-president of the Guaranty Trust Co., will talk on "The World Outlook for Business"; R. W. Proctor, sales manager of the Black & Decker Manufacturing Co., will discuss "Making the Jobber a Partner in the Selling Enterprise," and J. H. Barber, Walworth Manufacturing Co., will speak on "Maintaining Turnover on a 20,000 Item Line."

Chairmen of the various sessions include: E. P. Chalfant, Gill Manufacturing Co., president of the association; L. A. Safford, vice-president of the McQuay-Norris Manufacturing Co.; E. V. Hennecke, vice-president of the Moto-Meter Co.; R. E. Hayslett, treasurer of the Hydraulic Steel Co.; J. F. Hennessey, general manager of the Phinney-Walker Co.

The program committee has voted to waive the usual $10 registration fee and is urging executives to bring as many of their department heads as possible. The sessions will be held at the Mount Royal Hotel, where the delegates will be welcomed by Mayor Charles Duquette of Montreal. Local tours and entertainments will be given with the cooperation of the Montreal Automotive Jobbers Association, headed by M. W. Drayton of the Canadian Fairbanks-Morse Co.

Construction Activity Shows Akron Prospers

AKRON, OHIO, Sept. 9—Physical evidence of the growth and prosperity of the automobile tire industry in the last few years is reflected in a report of construction activities just made public by the city building department.

Before the end of 1925 approximately $4,000,000 worth of new factory buildings will have been completed or started by rubber companies in Akron. Nearly everyone in the industry predicted two years ago that the city's excess factory floor space would not be occupied for the next 20 years. Today every inch of surplus space is occupied, and the manufacturers are rushing new units and additions to completion.

NEW LINCOLN EQUIPMENT

DETROIT, Sept. 9—Cars now being shipped from the factory of the Lincoln Motor Co. are fitted with a dash type gasoline gage as standard equipment. This mechanical device is reliable and accurate and when properly installed and adjusted requires no attention.

The complete instrument consists of two major units, the tank unit and the dash unit. These two units are connected by a wire which passes through the indicator cable, which in turn is protected by a metallic housing. In operation, as the gasoline level in the tank is lowered, the cork float falls and through a lever and cam arrangement pulls the wire through the cable against the tension of the spring in the indicator unit and thus revolves the dash dial in an opposite direction.

Crittenden to Take Part in Motor Vibration Tests

BOSTON, Sept. 9—George A. Crittenden, sales manager of the Lovejoy Manufacturing Company, has sailed for Europe to establish agencies in foreign countries and also to take part in the competition and investigation being undertaken by French authorities to determine the best methods to save the foundations of buildings from being ruined through vibration by motor vehicles. This conference takes place in Paris this fall, and various devices are to be tested thoroughly to establish their value, after which a standard will be selected and every vehicle will be ordered to be equipped from a certain time on. Among the entrants is a set of Lovejoy Shock Absorbers, which will be tested out on a Marmon car owned by an English resident. Mr. Crittenden expects to put the car through its tests.

Chandler Sets Record for Pike's Peak Climb

PIKE'S PEAK SUMMIT, COLO., Sept. 7—Charlie Myers burned up Pike's Peak today with a Chandler, winning the seventh annual world's championship hill climb and smashing all former records. He drove the 12½ miles in 17 min. 48⅘ sec. The old record was 18 min. 15 sec. Glen Schultz in a Stutz was second in 18 min. 54⅘ sec. J. V. Plenderlith in a Lexington was third in 20 min. 3⅗ sec. Last year's record, which was the fastest up to that time, was made by Otto Loesch in a Lexington.

There were ten starters and the track was hard and fast. A larger crowd than ever before witnessed the race. Rain that fell Sunday night did not injure the track.

GASOLINE USE INCREASES

NEW YORK, Sept. 9—Production and consumption of gasoline in July in the United States established new high records for that month, according to the Bureau of Mines' figures. There were 963,000,000 gallons consumed in the United States in July, against 868,000,000 in June. Domestic production was 967,000,000 gallons, against 944,000,000 in June.

Aircraft Building to Go On as Usual

Goodyear Official Says That Loss of Shenandoah Will Not Affect Plans

AKRON, OHIO, Sept. 9—The wreck of the Shenandoah will have no effect on the building of Zeppelins and other types of airships here, according to F. K. Espenhain, vice-president of the Goodyear Tire & Rubber Co., America's leading airship manufactory and parent organization of the Goodyear-Zeppelin corporation.

Balloonets of the Shenandoah, which retained their gas content even after the ship broke in pieces, holding sections of it aloft and saving many lives, were made in the Goodyear aeronautical department here and sent to Lakehurst, N. J., where the ship was completed two years ago by the Bureau of Naval Aeronautics of the U. S. Government.

Loss of the Shenandoah, whose gas cells, or balloonets, held practically all the available supply of helium in this country, will interfere at least temporarily with the reported attempt of a private ariship navigating company to lease the Los Angeles from the Government for a try-out as a commercial venture, carrying inter-city passengers and freight, Goodyear experts say.

Goodyear engineers, headed by Dr. Karl Arnstein and Capt. E. A. Lehmann, late of the German Zeppelin Co., are now working on plans for a super-Zeppelin, which will be twice the size of the Los Angeles.

After viewing the wreck of the Shenandoah, aeronautical experts expressed the opinion that success for lighter-than-air transportation eventually will be found in inter-continental travel.

"More careful study of meteorological conditions must be made," they stated. "Aviators must be given information which will permit them to avoid storm centers, or aircraft must be strengthened until they are capable of outfighting the winds."

A detailed report on the disaster is now being prepared by Goodyear-Zeppelin engineers, which may change the course of dirigible history.

"If the findings of the experts indicate a structural weakness in the Shenandoah," it was pointed out, "future construction will eliminate that fault."

CHEVROLET PRODUCTION

DETROIT, Sept. 9—"Passing the two-million production mark emphasizes Chevrolet's progress," said W. S. Knudsen, president of the Chevrolet Co., recently. "The present record should not be the last, as the company expects to produce close to a half million cars during 1925, which will exceed by a wide margin the 1923 Chevrolet peak production."

Coming Events

SHOWS

Sept. 14-19 — Cleveland, Public Auditorium, Annual Convention and Exposition, American Society for Steel Treating, W. H. Eisenman, secretary.

Sept. 21-26—London, England, Annual Cycle and Motorcycle Show under auspices of the British Cycle and Motorcycle Manufacturers and Traders Union, Ltd.

Sept. 28-Oct. 3—Chicago, Fourteenth annual Safety Congress and Exhibit, Rainbow Room, Hotel Winton, under direction of National Safety Council, A. M. Smith, business manager.

Oct. 5-9—Atlantic City, Young's Million Dollar Pier, Manufacturers' Exhibition in connection with American Electric Railway Association Convention.

Oct. 8-17—London, Olympia passenger car show.

Oct. 18-31 — Salonica, Greece, First International Sample Fair.

Oct. 29-Nov. 7—London, annual truck show.

Nov. 26 - Dec. 6 — Berlin, Germany, Annual Automobile Show in the Kaiserdamm.

CONVENTIONS

Sept. 14-19 — Cleveland, Public Auditorium, Annual Convention and Exposition, American Society for Steel Treating.

Sept. 14-17 — Automotive Electric Association, Forest Inn, Eaglesmere Park, Pa.

Oct. 5-9—Atlantic City, Young's Million Dollar Pier, American Electric Railway Association.

Oct. 7-10—Montreal, Motor and Accessory Manufacturers Association Convention.

Oct. 21-23—Boston, Fall Meeting, American Welding Society.

RACES

Sept. 19—Syracuse, N. Y.
Sept. 30—Fresno, Cal.
Oct. 10—Baltimore-Washington Speedway, Laurel, Md.
Oct. 12—Salem, N. H.
Oct. 24—Charlotte, N. C.
Nov. 26—Los Angeles.

S.A.E. MEETINGS

National

Sept. 15-16—Cleveland, Production meeting and exhibition.
Nov. 12-13—Philadelphia, Automotive Transportation meeting.
Nov. — Service Engineering meeting.

Chemists to Discuss Motors and Fuel

NEW YORK, Sept. 9—Discussions of considerable interest to the automotive industry will be covered during the approaching Chemical Exposition, to be held in Grand Central Palace from Sept. 28 to Oct. 3, inclusive. Three of the four intersectional meetings of the American Chemical Society, arranged in conjunction with the exposition, are to be devoted to a symposium on motor fuel and oil conservation.

The opening paper on "Petroleum Aspect of Oil Conservation will be by K. C. MacKenzie, consulting chemist of the Texas Co., on Tuesday, Sept. 29. M. C. Whitaker, president of the U. S. Industrial Alcohol Co., will take as his subject: "Fermentation Industries and Motor Fuel," and A. C. Fieldner, superintendent of the Pittsburgh station of the United States Bureau of Mines, will discuss "Complete Utilization of Coal and Motor Fuel." C. F. Kettering, president of the General Motors Research Corp., will speak on "Motor Design and Fuel Conservation."

Each of the papers will be thrown open for general discussion, and various authorities have been invited to discuss the points brought out. The meetings will be held in the Chemists' Club and will be supplemented by moving pictures at the Palace, furnished by the United States Bureau of Mines and other organizations.

Restriction of Makes Builds Used Car Trade

ST. LOUIS, Sept. 9—By the end of 1926 used car stocks of the majority of automobile dealers will include less than 15 different makes of automobiles is a belief voiced by officials of the National Automobile Dealers Association, which arises from surveys conducted this year, in which it was found that many dealers already are restricting their purchases of used cars to a very few lines. Dealers generally will not go outside of their own and popular and handled lines.

Careful restriction of the makes of cars that will be accepted by an automobile dealer's used car stock is one of the prime essentials of building a successful used car business, says the association. It will have the effect of causing the dealer to refuse some deals in which he would deliver a new car, but it will also enable the dealer thereby to refuse new car business that he would obtain only at the expense of a large loss on the used car accepted.

One reason for the enormous reduction in used car losses from $126,000,000 in 1922 to less than $40,000,000 in 1924 was the determination on the part of dealers generally to refuse to take unprofitable deals.

Studebaker Policy and Condition Called Solid

NEW YORK, Sept. 9—A. R. Erskine, president of the Studebaker Corp. of America, commenting on the policy and condition of the company, said:

"We are building solidly for the future, both in the quality we are maintaining for our product and the strength of the company behind that product.

"Our cash holdings have been increased this year and now stand at upward of $17,000,000, after deducting about $2,000,000 in dividends paid Sept. 1. Viewed from any angle, the corporation is in the strongest position in its history.

"The automobile business continues at a surprising rate and I look for a big third quarter. Our sales in July and August amounted to 25,000 cars, and September's business will probably bring the total to more than 35,000 for the third quarter. We have been operating close to capacity since March 1, and there are at present no signs of any severe let-up. About 85 per cent of our production is now in closed models."

MOTION PICTURE ADVERTISING

BRIDGEPORT, CONN., Sept. 9—Motion pictures, in the form of a comedy-drama, are being employed by the Bassick Manufacturing Co., supplementary to their other advertising media, as a means of exploiting Alemite. The film, produced and released by the Atlas Educational Film Co. of Oak Park, Ill., is having national theatrical distribution.

Nash Sets Sales Record in August

KENOSHA, WIS., Sept. 9—Reports from The Nash Motors Co. state August sales of 10,675 cars set a new high monthly record, total volume of business running 24 per cent beyond the best previous month since the company was founded.

President C. W. Nash says, "This record was made with new Nash Special Six and Advanced Six models and does not include the Ajax Six volume for its third month of production, which would bring the total of cars sold in August up to a figure in excess of 12,400 units.

"The new Nash models, introduced July 23, have set in motion a country-wide demand for cars beyond anything Nash has ever experienced. Despite the fact that the twelve months prior to August were by far the biggest twelve months of business on our books, the greeting extended the new special Six and Advanced Six models makes it certain that all records established to date will be completely overshadowed during the coming period. August was the first month the new Special Six and Advanced Six models were in our dealers' hands and sales ran two and a half times as great as August, 1924.

"Unfilled orders now on file at the factory, at the conclusion of the greatest month we have had, are bulking high in the thousands and, in fact, would constitute of themselves an excellent month of a year or so ago. However, increased production reassures us on the point of being able to accord buyers reasonably prompt delivery of new models. We look for continued exceptional business and expect the Fall season to run far ahead of any other Fall since the company began manufacturing."

D. & M. OBTAINS MOTOR LICENSE

LANSING, MICH., Sept. 9—Permission to operate motor vehicles on the highways has been granted the Detroit and Mackinac Railway. This is the first railroad in the State to receive such permission. The permit covers the operation of a freight line between Alpena, Rogers City and Onaway.

AUTOMOTIVE INDUSTRIES
VOLUME 53 *New York, Thursday, September 17, 1925* NUMBER 12

Vehicle Exports This Year Will Go Over Half-Million Mark

Total for six months of 1925 is 40.3 per cent ahead of same period last year. Middle priced cars moving well. Prospects for rest of year are good in most sections.

WELL over a half million American motor vehicles probably will be sold outside the United States this year. Total exports from the United States and Canada plus foreign assemblies by American manufacturers are almost certain to cross the 500,000 mark for 1925 unless some very drastic change in overseas conditions takes place in the few remaining months of the year—and there is every indication that foreign business will be just as good in the last six months as it was between January and July.

The prediction of a half-million overseas sales is given weight by the export totals for the first half of this year, which show that 269,379 cars and trucks built by American firms were put into service outside of this country between the end of 1924 and July 1, 1925. Of this total 118,161 were exported direct from the United States; 23 297 were shipped from Canada and 92,312 consisted of foreign assemblies.

If export business for the last six months is equal to that of the first six, the total for 1925 will be nearly 540,000 vehicles, a gain of almost 44 per cent over the record-breaking figure of 377,724 which was attained last year. If business for the last six months drops off 7.7 per cent—as it did in the last half of 1924 as compared with the first half—the 1925 total still will be in excess of 530,000. In other words, export vehicle sales for the last half of 1925 can drop off nearly 14 per cent as compared to the first half and still permit total sales to go over the 500,000 mark.

A big increase in total 1925 export business is portended strikingly by the actual result achieved during the first six months which shows gains all along the line. Car exports from the United States increased 45.7 per cent as compared to the first six months of 1924; car exports from Canada gained 6.08 per cent; truck exports from United States went ahead 55.9 per cent, although Canadian truck exports fell off .009 of 1 per cent. Foreign assemblies for the first six months of 1925 were 41 per cent ahead of the same period in 1924. Data are not available to show what proportion of foreign assemblies is cars and what proportion is trucks.

It is interesting to note, however, that while passenger car exports from the United States increased 45.7 per cent in number, the first half of this year as compared with the first half of last, they increased approximately 60 per cent in value. The same trend appears to a lesser degree in the Canadian exports where the number of vehicles shipped abroad showed a 6.08 per cent gain, while the value went up 8.05 per cent. These figures are particularly significant when it is realized that they cover a period of generally declining car prices, despite the fact that a majority of price reduction did not occur until after July 1. The level of American passenger car prices was somewhat lower in the first six months of 1925 than in the similar period of 1924.

Thus it appears that the middle and higher priced cars are really beginning to go forward in overseas markets to a greater extent than ever before. This general conclusion is borne out by statements made by prominent individual manufacturers of middle-priced vehicles regarding their export achievements for the first half of this year. The possibilities for future progress seem particularly great when it is realized that, as pointed out by Percy

Comparison of Motor Vehicle Exports for First Six Months of 1924 and First Six Months of 1925

	1924	1925	Gain or Loss
From United States			
Cars	80,293	118,161	+ 45.7%
Trucks	14,571	23,297	+ 55.9%
	94,864	141,458	
From Canada			
Cars	23,931	28,439	+ 6.08%
Trucks	7,238	7,170	— .009%
Assemblies Abroad	65,491	92,312	+ 41.0%
	96,660	127,921	
Total	191,524	269,379	+ 40.3%

Owen, chief of the Automotive Division, Bureau of Foreign and Domestic Commerce, American producers are not getting as large a proportion of foreign sales as they were in the years immediately following the war; if American exporters can get and hold as great a proportion of the foreign market as they had immediately after the war, an even greater rate of business growth is to be expected.

While the car and truck manufacturers have been making these tremendous strides in the export field, the parts makers have been finding the road to foreign sales a bit rougher. Parts sales in the first six months of this year fell below those of last year's first half by about 7.5 per cent, the total business for January-July, 1924, having been $44,236,937 as against $40,948,131 for January-July, 1925.

These figures seem to bear out the conclusions reached by M. L. Heminway, general manager, Motor and Accessory Manufacturers Association, as a result of his recent European trip to the effect that, while there is a constantly expanding market for American parts and accessories abroad, this market will not expand as rapidly nor as easily as that for complete vehicles.

One group of parts producers, however—the tire manufacturers—are continuing to make progress in the face of very bitter European competition. Tire exports from the United States gained 29.3 per cent in number and 21.6 per cent in value, the first six months of this year.

The growing facilities for financing retail time sales in various foreign countries, the increasing dealer representation being acquired by those American firms which seriously have entered the export market and the probable production of some type of small light car for overseas sale by more than one American producer are factors which probably mean a still greater increase in foreign automotive business in the next two years. All of these factors will have a bearing on the permanent development of the foreign field.

For the rest of this year prospects are good in general, with relatively few soft spots appearing.

Particularly good strides are being made in Argentina and some of the other South American countries. Nearly 100,000 new cars and trucks were sold in Spanish speaking countries during the first six months of this year as against something like 125,000 during the entire twelve months of 1924. One competent observer estimates that total sales for the Argentine alone will be 60,000 cars and trucks this year.

Exports of Cars, Trucks, Tires and Parts for the first six months of 1924 and 1925

CAR AND TRUCK EXPORTS

From the United States

	1924		1925	
Passenger Cars	No.	Value	No.	Value
Up to $500	30,980	$11,210,243	43,759	$15,850,053
$500 to $800	24,067	16,034,766	31,010	21,991,723
$800 to $2,000	23,495	25,333,685	29,346	30,704,548
Over $2,000	1,751	4,887,706	11,300	16,807,566
			2,746	7,436,539
Total	80,293	$57,466,400	118,161	$91,890,429
Motor Trucks				
Up to 1 ton	11,250	$4,560,521	18,095	$7,641,485
1 to 2½ tons	2,602	3,492,127	4,444	5,650,325
Over 2½ tons	719	1,782,910	758	2,302,120
	14,571	$9,835,558	23,297	$15,593,930
Total U. S. cars and trucks	94,864	$67,301,958	141,458	$107,484,359

From Canada

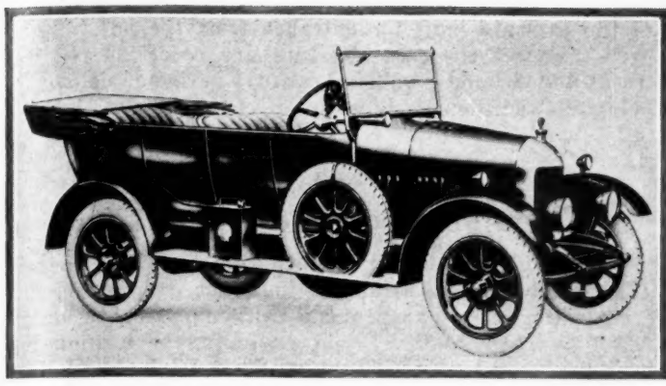
Passenger Cars	23,931	$11,837,103	28,439	$12,789,843
Trucks	7,238	2,461,656	7,170	2,278,257
Total Canadian cars and trucks	31,169	$14,298,759	35,609	$15,068,100
Total United States and Canada car and truck exports	126,033	$81,600,717	177,067	$122,552,459

Tire Exports from U. S.

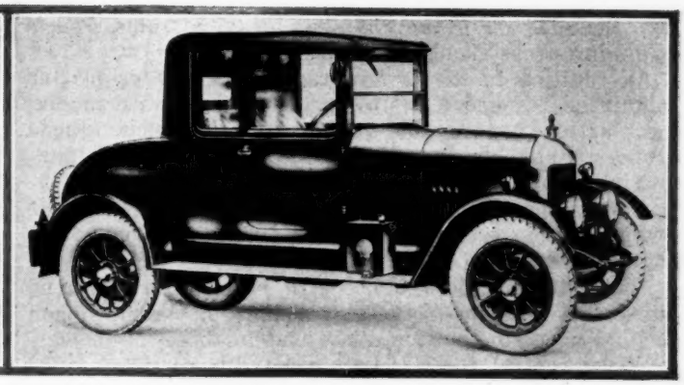
Tires				
Casings	609,106	$7,382,889	803,790	$9,427,601
Inners	559,180	1,037,301	723,969	1,244,396
Solids	56,106	1,037,301	55,040	1,414,918
	1,224,392	$9,922,291	1,582,799	$12,086,915

Parts Exports U. S. and Canada

Parts—United States	.....	$44,236,937	.....	40,948,131
Parts—Canada	.....	2,783,114	.....	2,567,503
Total United States and Canadian parts—Exports	.....	$47,020,051		$43,515,634



Four-passenger touring Morris-Cowley, equipped with four-wheel brakes and selling for £190, including one year's insurance



New Morris-Oxford three-quarter coupé, selling for £395, including one year's insurance

Latest 12 Hp. Morris-Cowley Model Fitted with 4-Wheel Brakes

Balloon tires also standard and heavier frame is used. Larger Morris-Oxfords have thermostatic coolant control. Prices cut.

By M. W. Bourdon

MORRIS, the British manufacturer, with a current output of 1500 cars per week and plant extensions in hand to secure an output of 2000 per week next spring, has announced his program for 1926. Appreciable price reductions apply to all models.

Four-wheel brakes are made available with the 12 hp. "Cowley" cars as well as with the 14 hp. "Oxford" models as hitherto. For the latter models, the Barker system of dipping headlights (with control from the driving seat to prevent the dazzling of oncomers) has been adopted as standard, also thermostatic control of engine cooling by means of a valve in the uptake pipe from engine to radiator.

Wheels of the Oxford cars will be black enameled, the electric horn arranged under the hood and a molded ebonite battery box sunk into the running board. Other new features common to both Cowley and Oxford models are reinforced Dunlop balloon tires (four-ply instead of two-ply), a day-and-night reading radiator thermometer, an improved slow-running control and various detail improvements and additional equipment for all bodywork.

The four-wheel brakes of the Cowley models are of the same type as fitted to the Oxford this year, although the drums are 9 in. in diameter as against 12 in. in the larger car; they are made under the Rubery patents, designed to distribute braking effect as to 40 per cent on the front wheels and 60 per cent on the rear wheels, and to ensure that when the brakes are used on corners the braking effect on the outer front wheel is reduced automatically and in proportion to the wheel lock.

The Cowley engine has been modified in various details, notably in the fitting of the same type of light alloy pistons as used in the larger engine. Additional power output is claimed as a result of the alterations. Body improvements in the open cars of this smaller model include outside as well as inside door handles, increased height of doors and a choice of blue and grey finish and upholstery; additional rear-quarter lights are provided in the fixed head coupé, two doors are fitted on the left of the saloon (instead of one each side with tip-up front seats), front seats are adjustable for leg-reach and a parcel net in the roof and a "smoker's companion" are

The new and old prices of Morris cars, Cowley and Oxford models, are as follows:

12-Hp. Morris-Cowley

	New Price £	s.	Old Price £
Two-seater, without four-wheel brakes...	162	10	175
Two-seater, with four-wheel brakes.....	170	0	...
Occasional four-seater, without four-wheel brakes	172	10	185
Occasional four-seater, with four-wheel brakes	180	0	...
Full four-seater, without four-wheel brakes..	182	10	195
Full four-seater, with four-wheel brakes .	190	0	...
Fixed head coupé, with four-wheel brakes	195	0	210
Two-door saloon, with four-wheel brakes.	235	0	250

14/28-Hp. Morris-Oxford
(Four-wheel brakes fitted to all models.)

	New Price £	Old Price £
Two-seater	240	260
Four-five seater	260	285
Coupé (folding head)	285	305
Three-quarter coupé (folding head).....	295	...
Cabriolet	330	365
Saloon (four-door)	350	385
Landaulet	360	395

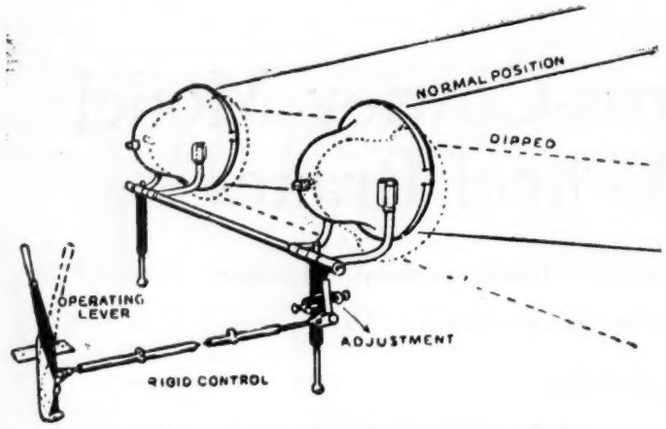
All prices (Cowley and Oxford models) include one year's free insurance policy.

now included. For the chassis a heavier frame with a stiffening cross-member at the front is used.

An addition to the Oxford range is the three-quarter folding head coupé. Improvements in the four-door six-light saloon include side pockets formed below hinged arm-rests, silk blinds, rug rail, roof ventilator and light, and inlaid doors with mechanical window lifts.

A brief specification of the Cowley and Oxford chassis (which are identical in design and dimensions apart from engine bore and wheelbase) is:

Four cylinders, Cowley 69.5 m.m. bore, Oxford 75 m.m. bore, stroke 102 m.m., L head cylinders, thermo-siphon cooling, magneto ignition, plate clutch, three-speed gear-set with central control, unit construction, spiral bevel drive, half-elliptic springs in front, three-quarter elliptic rear; wheelbase, Cowley 102 in., Oxford 108 in.



The Barker system of dipping headlights, adopted as standard on 14-hp. Morris-Oxford cars

The announcement contains no reference to six-cylinder or straight-eight models, so it may be assumed that the widespread reports that such types are to be offered at Olympia or later are premature, to say the least. Nor is any mention made of cellulose finish, and the same remark can be held to apply in this connection.

To prevent Morris cars from being over-driven by men employed by dealers to collect new cars from the plant, they are now being fitted with a washer, sealed in place and with an orifice of ⅜ in. diameter, between the carbureter and the cylinder block. This washer effectively limits the maximum speed on high to 27-30 m.p.h. on level roads, and is inserted after the engine has been tested (1) on the bench for four hours, (2) on the chassis test and (3) on the final road test. Buyers are asked to see that these speed-controlling washers are in position when cars are delivered to them and that if the seal is found broken, or bears signs of having been tampered with, to refuse to accept delivery.

Morris maintains that a well-made engine is stiff and tight when new, and that it should be run-in carefully during the first 500 miles; he says he could adopt greater clearances for pistons, bearings, etc., to avoid the need for that early care, but prefers to make power-units that will be stiff when new but will give better service than a "slack fitting" engine after the initial period of use.

A LAW has been passed in Italy recently whereby the right hand rule of the road is established throughout the kingdom for all classes of vehicles. Great difficulties are being encountered in the enforcement of this rule, for the reason that in some of the cities the street railway tracks are on the left side of the road and all of the cars are built for entrance from the left. Wherever this was the case the cars are being altered and tracks and switches are being relaid, a period of six months being allowed the companies to effect the change.

Fire and Shock Proof Gas Tank

A GASOLINE tank for mounting upon a truck chassis, which will withstand a four-foot drop upon concrete while fully loaded and a thirty-minute fire underneath and around it without exploding or leaking has been designed by the Columbian Steel Tank Co. of Kansas City to meet the very rigid requirements placed upon such tanks by the New York City Fire Department.

A tank filled with water and weighing 17,000 lb. was dropped upon a pavement consisting of cobble stones embedded in concrete without denting or otherwise injuring it. In another case a tank was given a fine test by officials of the New York Fire Department. The tank was filled with over 1000 gal. of gasoline and elevated a few feet above the ground. A bale of excelsior was strewn underneath and then saturated with about 50 gal. of gasoline. While gasoline was being discharged from one of the compartments of the tank the excelsior was fired and instantly the tank was surrounded by flames.

Within 40 seconds a fusible plug on the faucet of the discharging line had melted and shut off the gasoline flow. Within 60 seconds the fusible links in the valve chamber door props released the door, which in dropping tripped another valve and shut off the flow at a point in the top of the discharging compartment.

Each of the six compartments into which the tank was divided is equipped with ¾-in. triplex valves and safety diaphragms to relieve internal pressure. Under the intense heat generated some of these diaphragms blew out and a small blaze started over the holes. Because of the presence of a fire screen underneath this blaze could do no damage and was easily extinguished when the fire under the tank burned out.

All the safety devices protecting the tank functioned perfectly. There was no explosion and no loss of gas except an almost inappreciable one from the compartments in which the safety diaphragm blew out.

The tank is constructed of 3/16-in. sheet steel. The partitions separating the six compartments are of sheet steel and are extended below the tank to form a base by which the tank is supported on the truck chassis. This method of construction enables the tank to withstand the severe dropping test without springing leaks or otherwise showing any ill effects. The base plates are reinforced by tubular longitudinal members which, for tanks outside of New York, also carry discharge pipes. (Siphon discharge is necessary under New York regulations.)

At the front end the tank is supported at a single point with a flexible connection to relieve it of distortion strains transmitted through the chassis.

It is possible to discharge only one compartment at a time and the control is so arranged that the truck engine must be stopped before discharging. The siphon discharge method used in tanks destined for use on the streets of New York is placed in operation by a few turns of a hand air pump located in the valve chamber. Accurate metering devices are made part of the equipment.

Each of the six compartments holds 250 gal., giving a total capacity of 1500 gal. Weight of the tank when full is about 17,000 lb., so that it can be installed on any standard 7-ton truck.

Machine Tool Men Discuss Production Problems at Annual Exhibit

Sentiment in industry more optimistic than any time in last five years, says President Iles of Tool Builders. New shop processes are discussed. Recent developments in aircraft matters outlined.

By P. M. Heldt

VARIOUS live topics in machine shop operation, the economic outlook of the machine tool industry and recent progress in aviation were discussed at the meeting of the New Haven Branch of the American Society of Mechanical Engineers held in New Haven, Conn., in connection with the annual exhibition of machine tools in the Mason Laboratory of Mechanical Engineering, on Thursday, Friday and Saturday of last week.

President O. B. Iles of the National Machine Tool Builders' Association in an address on the "Future of the Machine Tool Industry" said that at no time during the past five years had sentiment in the industry been as confident as it was at present.

The future of the machine tool industry, he said, was assured by the fact that users demanded more and more and better and better machine tools. The demand was particularly urgent from those industries which went in for mass production. On the other hand, the opportunity for mass production in the tool industry was rather scant.

There had been some talk of combinations in the industry with the object of reducing overhead expenses, and this was a possible development of the future. In fact, there had been some amalgamations of the kind in the past and the movement was likely to continue.

Specialization was the order of the day and there had been some talk that in the future machine tool builders would confine themselves to the production of one or two types of tool. The speaker believed that specialization would be along the line of particular processes of metal cutting. That is, manufacturers would specialize on either lathes, milling machines, shapers, etc.

Methods of distribution also demanded attention. While in the past many tools had been sold through agents, at the present time there was an obvious tendency away from the agency system, especially on the part of the larger concerns in the industry. One objection to the agency system was that agents generally handled a great many lines and it was entirely beyond their staffs to devote the proper attention to each of the lines handled.

The Used Tool Problem

Mr. Iles also referred to the used tool problem, indicating that the machine tool industry is struggling with a problem similar to that faced by the automobile industry, although it is evidently less acute than the used car problem. He made the point that if a tool had become unprofitable or obsolete for one particular operation it was not necessarily obsolete for all purposes. Cooperative research was another subject mentioned, and the speaker suggested that it be carried out through the National Tool Builders' Association.

The program of the meeting called for a session of some standardization committees of the A. S. M. E. in the forenoon, a technical session during the afternoon and a session devoted to topics of economic interest in the evening.

The meetings were held in the Lamson Lyceum and the Dunham Laboratory of Electrical Engineering, both located convenient to the exhibition building.

A paper on "Centerless Grinding" by W. J. Peets of the Singer Mfg. Co. aroused considerable interest among the production men who heard it. In the centerless grinder two abrasive wheels have their peripheries face each other, one of the wheels being so mounted that its axis can be swung out of parallel with the axis of the other by varying amounts. Between these two abrasive wheels is the rest which supports the work. (Fig. 1).

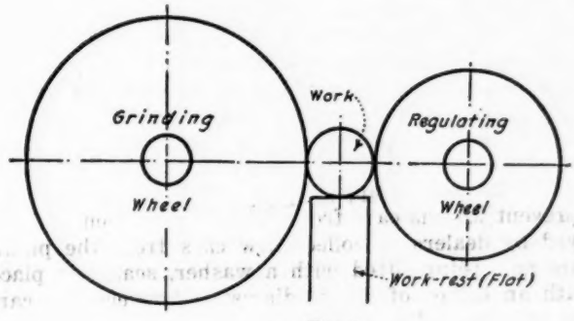


Fig. 1

Centerless grinding—work on rest between two abrasive wheels

The two wheels are run at different speeds, the fast-running or grinding wheel at the regular grinding speed of 5500 to 6000 r. p. m. at the periphery, and the slow running or regulating wheel at the work speed only, which latter varies with the material, length, diameter and other characteristics of the work. The wheels are revolved so that their adjacent faces move in opposite directions; therefore, a piece of cylindrical work placed on the rest between the wheels and touching both of them will be revolved by contact with their two surfaces. The wheels are revolved at different peripheral speeds, because if both ran at the same speed the work between them would be merely revolved as an idler gear, with no grinding action. The difference in surface speed between the two grinding wheels imparts the necessary relative motion for grinding.

The work between the two wheels will take the same peripheral speed as the slower-running or regulating wheel, as if geared to it. Thus we have the cylinder to be ground between two abrasive wheels of different sur-

face speeds but turning as if geared to the slower of the two, and being held against the work rest by the pressure of the grinding wheel.

Now, if the axes of the two wheels remain parallel, the cylinder placed between them will receive no motion except that of rotation. However, if the axis of one wheel is thrown out of parallel with relation to that of the other, as well as out of line with the work rest, as shown in Fig. 2, a lengthwise motion will be imparted to the work, causing it to travel lengthwise past the wheel surface a certain amount per revolution of the

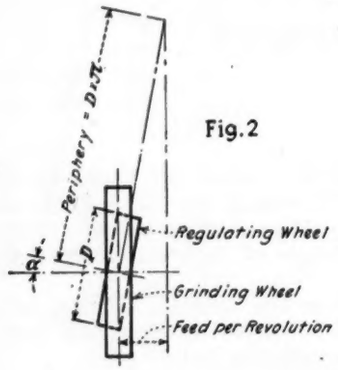


Fig. 2

Adjustment of regulating wheel for feeding

regulating wheel, according to the adjustment given that wheel for this purpose. Thus the speed of passage of the work through the machine is governed by changing the angle between the axis of the two wheels.

Therefore, according to the relative axial position of the two wheels, the centerless grinder may be employed for two distinct classes of grinding. (1) By setting the axis of the regulating wheel parallel to that of the grinding wheel, the work may be ground without lengthwise travel. This affords wide application of centerless grinding to all kinds of shouldered work, such as studs, having one or more diameters, and is known as "straight in" grinding. (2) By setting the axis of the regulating wheel at an angle to the axis of the grinding wheel, as shown in Fig. 2, the work is kept in constant lengthwise motion through the machine, this being known as "through" grinding. In this latter case there is no forward movement of the regulating wheel, except as it must be advanced by the operator from time to time to compensate for wheel wear, or its distance from the grinding wheel changed to accommodate different sizes of work.

The chief advantage of centerless grinding over "between centers" grinding is that the action (in through grinding) is continuous. This means that the machine is grinding all the time, and that the time waste which occurs in between-centers grinding incident to placing the work between centers, putting on and removing dogs, advancing the wheel to the work, etc., is eliminated. In fact, on work of small or medium diameter and length the operator is kept very busy simply feeding the machine.

A much smaller stock allowance for grinding is necessary than in between-centers grinding due to all errors in centering being eliminated and to the fact that only enough stock need be removed to take away the tool marks. While it is necessary to remove from 0.006 in. to 0.015 in. when grinding between centers, as little as 0.00075 in. is sometimes sufficient in centerless grinding.

As a rule the work is supported better in centerless grinding. This is especially true of pieces which are long in proportion to their diameter.

The size of work can be held to closer limits on the centerless grinder with less skill on the operator's part, as the wheels are not moved during grinding, and the chances of error arising from infeed of slides, stops, etc. are eliminated. Also, in centerless grinding stock is removed from the diameter instead of from the radius of the work, which reduces by one-half any error due to wheel wear (as compared to between-centers grinding), while the wheel wear is minimized by the comparatively light cut taken, making unnecessary frequent adjustments for holding size of work.

This simpler type of machine, besides requiring a less skilled operator, also effects a considerable reduction in upkeep expense, as the only moving parts while operating are the two wheel spindles and the mechanism for turning them.

No centering is required.

The main disadvantage, or limitation, of the centerless grinder is that quantities of work must be fairly large to warrant setting up the machine.

The type of work is limited to pieces of one diameter for through-grinding, and of one or two diameters for shoulder work in straight-in grinding.

The centerless grinder cannot hold the outside of a bushing concentric with the hole, and for best results, flats and keyways or oil channels (especially those running to the end of the piece) should be avoided.

Exact roundness such as is required for gages, etc., is harder to obtain than on the best types of between-centers grinders. By this is meant uniform roundness well within a tenth of a thousandth of an inch (0.0001 in.).

Thus the field of usefulness of the centerless grinder may seem somewhat restricted, but there is an ever-growing variety of work which can be ground by this method, or which can be designed so as to be so ground.

We may say that this type of machine is preëminently suited to straight cylindrical work of one diameter, with no exact reference to bore, and with no prolonged breaks in the surface.

Practice in producing straight centerless-ground work varies considerably. In some shops considerable metal is left on for grinding—in some cases as much as 0.016 in. to 0.020 in., and even 1/32 in. Where so much is allowed for grinding, more passes through the machine, and at a slower speed, are necessary. This means greater labor cost, as well as greater wheel wear and cost. As a rule, as little stock as possible should be left for removal by centerless grinding.

Feed Limits the Speed

In many cases the limiting speed factor is the ability of the operator to feed the machine, rather than the capacity of the machine itself. The peripheral speed and the grade of wheels used are the same as for the same work on any other grinder. However, by leaving a minimum of stock to be removed, a finer-grain wheel may be used and a finer finish obtained. For through-grinding, however, the grinding wheel should be soft enough to dress itself, or wear down by contact with the work, and not glaze or load up. When a wheel is soft enough to dress itself in this way, frequent diamond dressing is unnecessary, and it may be necessary to dress only once in several weeks by passing an emery stick across the wheel face to remove small particles of metal. For this reason wheels made with a rubber or an elastic bond are often successfully used.

For through-ground work the dressing of the regulating wheel is really more important than that of the grinding wheel. As the axis of the regulating wheel lies at an angle to the work, it is necessary that the dressing of this wheel should occur at the same angle. One way of accomplishing this would be to remove the work rest

from the machine and put in its place a dressing slide moving in the same plane and carrying the diamond at the same height in relation to the wheel center as the point of contact between the work and the regulating wheel. When the diamond traverses the wheel in this position, the result will be a perfect contact of the regulating wheel with the work during grinding—which is the requirement. Again, the dressing slide for the regulating wheel may be mounted at some other point around its periphery, and correct results obtained by swiveling this slide to the same angle to which the wheel is swiveled and moving the slide or diamond tangentially above or below the wheel center to correspond to the contact of the work with the wheel.

Dressing the Grinding Wheel

The grinding wheel is dressed parallel to the regulating wheel by means of a suitable slide. However, as soon as work is introduced between the wheels, the grinding wheel gradually dresses itself away at the entering side until cutting takes place all across its face, the final sizing being accomplished as the work leaves the wheels. It will thus be seen that the original parallel dressing of the grinding wheel is lost after a few pieces have passed through and that instead of the faces of the two wheels remaining parallel, they are out of parallel by the amount of stock which is removed during one pass through.

Here will be seen a further necessity that the grinding wheel be soft enough to dress itself by contact with the work passing through. The regulating wheel has practically no grinding action and so does not wear away as the work is rolled upon its surface. It is common practice to have the regulating wheel somewhat harder than the grinding wheel.

It is necessary in through-grinding to have guides of some sort to start the work in line with the wheels and to guide it as it leaves them. These guides are usually parallel strips of hardened steel, adjustably mounted so as to form side boards along that part of the work rest which projects beyond the wheels. Facility of adjustment is an important factor in setting these guide plates, and some experience is necessary to do it properly. Generally speaking, the guides should extend at the front and back of the machine to a distance equal to the length of the work being ground, as they are particularly necessary on long work of small diameter, which has a tendency to whip if not properly supported.

In order to ensure roundness of ground work that is originally not round, the work is supported on an inclined surface as shown in Fig. 3.

Paul M. Mueller of the Pratt & Whitney Co., in a paper on "Precise Cylindrical Lapping," described the Hoke process employed by the company mentioned in the production of highly accurate cylinders to be used for gaging purposes. In the Hoke lapping machine there are two stationary, emery charged lapping surfaces and the cylinders are moved around between them by means of a cranked spider. The top lap floats and is constrained only against rotation. Mr. Mueller described the method in detail and in a summary said that by it any round piece can be lapped in quantity to a highly finished and accurate surface with speed. Where the conditions demand, extreme precision can be maintained with practical equipment and controls. The apparatus for lapping is not particularly expensive, nor is it difficult to maintain and operate. From the gage-user's viewpoint, the chief value of the method is its inherent ability to cheapen overall gage cost.

Wear metal or "plus" metal on a gage is the greatest factor in determining gage economy. This plus metal is always the algebraic sum of the positive wear allowance and the negative gagemaker's tolerance. Thus the smaller the latter, the greater the economy becomes, provided of course that the reduction of tolerance to the gagemaker is not attended by proportionately increased cost.

This lapping method is able to accomplish the desirable result in a practical manner when the quantity of gages of a size is twelve or more, and the economy increases until the number of a size is the number which

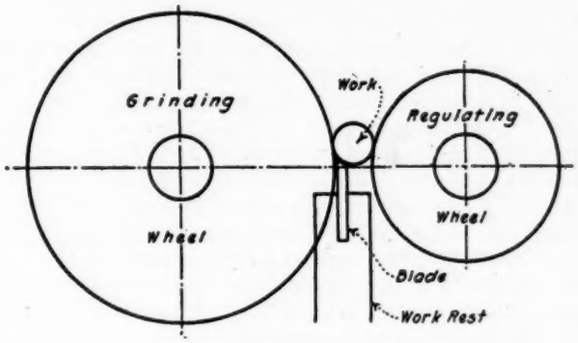


Fig.3

Arrangement for rounding up out of round work

can be placed at once in two lapping machines under the control of one operator.

Luther D. Burlingame of the Brown & Sharpe Mfg. Co. presented a paper on "High Speed Cutting of Brass and Other Soft Metals in Standard Machine Tools."

Generally speaking, the same styles of cutting tools, but provided with less clearance, are used when cutting soft metals as when operating on steel. This is not always the case, however, as rolling threads on soft metals is a common practice and sometimes can be used to marked advantage. It is possible also to use skiving methods, especially effective when operating on aluminum.

As to the comparative use of carbon and high-speed-steel tools, there seems to be a difference of practice.

The highest cutting speed in the examples described in the paper is in a milling operation operating at 1050 ft. per min.; in this case carbon-steel cutters are used, these not requiring to be sharpened oftener than once in two days, even when cutting dry. In the case of many screw-machine jobs the diameter of the work is so small that the surface speed of the cut is below the maximum, so that the cheaper carbon-steel tools can be used without question. Where high-speed-steel tools are used without grinding they may not give as smooth a finish as will carbon-steel tools.

While much work in cutting soft metals, especially in milling, is done without the use of a coolant and tools will stand up surprisingly well under such conditions, the general practice is to use some coolant, usually lard oil. Even those who make a practice of using lard oil exclusively, however, admit that it is not only much more expensive but is not as satisfactory as a coolant as some of the soda-water preparations. The difficulty in the use of soda water is its penetrating to the bearings and getting between the slides of the machine, resulting in hard action and breakage.

A coolant which gives good results in machining aluminum is made by mixing equal parts of kerosene and lard oil.

Although steel costs but approximately one-third as much as brass, the much greater speed possible in machining the latter often makes possible such an increase in production that the question of initial cost of the

stock is not only offset but a material reduction in cost results from using the more expensive metal.

F. L. Horner, chairman of the New Haven Air Board, introduced the speaker on the aeronautical subject, G. H. Hoppin of the Stout Metal Airplane Co. In the course of his address he asserted that more interest had been aroused in commercial aeronautics during the past six months than during the whole previous history of the movement, and the credit was due chiefly to the Ford Motor Co.

Mr. Stout in his paper, from which abstracts were read by Mr. Hoppin, discussed the problem of commercial airplanes in a general way, emphasizing points in respect to which they differed from military airplanes, and then went on to a description of the type of metal commercial airplane developed by him and at present being used in the Ford interplant service. Mr. Stout said the original ship, the Maiden Detroit, had now been in service for a year and a half. For the first year this was without any finish or paint coating of any kind. Over 1000 passengers were carried in the plane before it was finally sold to the Air Mail. The speaker asserted that except for workmanship it is impossible to tell the difference between this plane and the latest one coming off the jigs. The metal is in its original shape, rivets are intact, metal is like new, and the structure is as rigid as when first put together.

Plane No. 1 on the Ford airline cannot be told from the newest planes coming off the line, although it has transported 121,553 pounds of merchandise during the four months that it has been in every-day service.

There are two things to be watched closely in the development of a commercial plane. First, it must be remembered that every pound carried is worth 20 cents per hour while in the air. If one can save 100 pounds, this means $20 per hour, and $200 per day on a 10-hour flying schedule. To add 100 pounds weight to a plane is to take $200 earning capacity per day off the ship—a feature entirely forgotten, seemingly, by many foreign commercial airplane constructors.

Another item is of even greater importance, and that is parasite resistance. For every pound you can save in head-on resistance of forward travel, you can add from 8 to 10 pounds of load to your plane, so that there are two methods of increasing the performance of a given plane with a given engine.

First, save head resistance, and second, weight. The final solution of the real commercial plane can only be had by sticking to one machine and one design, and developing it through to an extreme of both these items. Having obtained performance by elimination of weight and head resistance, and having an airplane unit that is capable of carrying the load desired, one comes straight up against earning capacity.

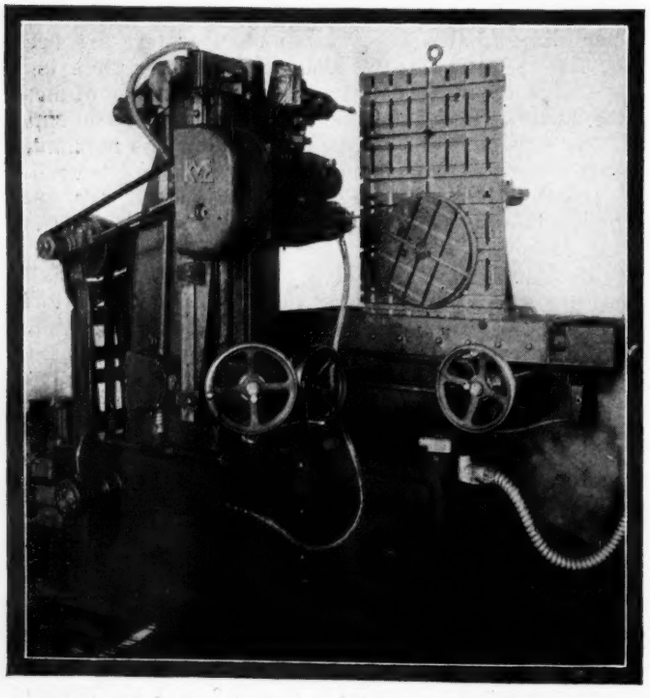


Fig. 4—Keller type BL tool room milling machine

Must Earn a Dividend

If the plane cannot earn a dividend it is not a commercial plane. With the expense of building planes in small numbers, the individual investment now runs high, and this means an excessive service on the part of the plane to pay a dividend. Flying on airways is not different in principle from running a railroad, a motor bus line, or a fleet of inter-city trucks. Rolling stock must be kept busy, and equipment must work the most hours per day. No matter how good a plane is, if it flies for one hour per day, there is no chance for a reasonable dividend. When we can build a plane that will fly continually for twenty hours per day, then aviation will have arrived.

While the machine tool exhibition was highly interesting, in that nearly all the machines were demonstrated, there were few machines that have not yet been described in the press.

A new tool room miller was exhibited by the Keller Mechanical Engraving Corp. of Brooklyn, N. Y. This machine operates on the same principle as the automatic die-sinking machine brought out by the same concern some years ago, and is likely to find wide application in the production of special fixtures. The miller is used to remove metal from a plate or block so as to reproduce what might be called an inverse or a negative of a pattern or master form. A pilot passes over the master form and the variations in the surface of the pattern cause it to make and break electric circuits, with the result that the tool is fed in or out. There is very little pressure between the master form and the pilot and hence it is not necessary to have the master form in metal.

Horizontal Travel of 22 In.

The machine exhibited has a limiting horizontal travel of 22 in., vertical travel of 14 in. and a traverse or infeed of 8 in. Each motion has an individual power unit and feed. The machine also can be operated by hand, and travel in any one direction can be made independent of the others. Mechanical electric contacts operate magnetic clutches by which the different feeds are obtained.

The machine is claimed to combine accuracy with rigidity and sensitiveness. With it a multiplicity of operations can be performed which otherwise would tie up several machines and would introduce additional errors in the work due to repeated mounting.

Practically all of the prominent manufacturers of ball and roller bearings were represented at the show and the introduction of anti-friction bearings in the machine tool field seems to be making rapid progress. Many of the machines exhibited carried signs that they were fitted with bearings of this or that make. The exhibits at the stands of the bearing makers included the well known devices designed to bring home particularly to the layman the fact that when mounted on anti-friction bearings heavy masses can be revolved with the expenditure of an insignificant effort.

Chromium Found to be Satisfactory as Coating for Reflectors

Research shows that plated chromium is ductile, cannot be scratched with a pin or knife, has relatively high coefficient of reflection and does not tarnish under heat.

THE reflection properties of chromium were discussed in a paper presented at the annual meeting of the Illuminating Engineers' Society in Detroit, Sept. 15-18 by Robert J. Piersol, research physicist, Westinghouse Electric & Mfg. Co., with a view particularly to its application to plating the reflecting surfaces of headlight and searchlight reflectors.

Mr. Piersol traced the history of the reflector from the mirror. All reflectors naturally divide into two main classes, diffuse and specular. Porcelain and white enameled reflectors are good examples of the first type, which is used mainly for indirect lighting; specular reflection requires a surface of high polish.

Among the specular reflectors the glass reflector holds first importance. A thin plating of silver is protected from corrosion in the front by transparent glass and in the rear by opaque enamel. The glass surface is of specular smoothness so that the silver may be plated against the glass. This gives a surface equivalent to a polished silver surface. The coefficient of specular reflection is very high, being about 92 per cent.

The Silver Reflector

Perhaps the reflector of second importance is the silver reflector. This reflector is made by silver plating a metallic base such as copper. The silver surface is polished and protected from weathering by a thin coat of lacquer. The coefficient of reflection of a highly polished silver surface may be as high as 95 per cent. The coating of lacquer (although fresh lacquer appears transparent) reduces the coefficient of reflection as much as 20 per cent. The nickel-plated reflector is assuming prominence. Since nickel does not corrode under atmospheric conditions as rapidly as silver it does not require a lacquer. But the coefficient of reflection in nickel is comparatively low.

Especially in flood-lighting, aluminum and several of the aluminum alloys, such as duralumin, are receiving some attention. Although metallic aluminum oxidizes very readily, fortunately the surface oxide film, which protects the interior metallic aluminum from oxidation, is transparent to light. Also, some of the silicon steels retain a reflecting surface under corrosive conditions due to a protecting transparent oxide film. The coefficient of reflection of these types of material is still lower than nickel.

The application of glass reflectors is limited by the fact that the glass is very fragile. Also, the cost of a glass reflector increases very rapidly with size so that for reflectors above 12 in. in diameter the cost becomes excessive.

For automobile headlights the silver reflector is popular. Its efficiency is reasonably high while it is new, the coefficient of reflection being as high as 75 per cent, but within a short time the lacquer darkens, reducing the reflection to less than half its previous value. If an attempt is made to clean the dirt off the surface the lacquer is scratched, permitting tarnishing of the silver. Even finger prints will immediately darken the lacquer, and the efficient life of an automobile headlight is usually not more than a year or two.

The coefficient of reflection of freshly polished nickel is about 60 per cent, but this percentage decreases rapidly with tarnishing. The surface is soft and becomes scratched in cleaning, thereby reducing the specular reflection. Nickel polishes, which are mostly acid, are satisfactory in cleaning nickel ornaments, but the eating away of the tarnished film destroys the reflecting surface.

Stainless steels give coefficients of reflection as high as 40 per cent. The reflection is somewhat selective, and, therefore, the reflected light usually has a bluish or brownish tinge. Also, this type of reflector material oxidizes, showing a pronounced film when subjected to a temperature of 300 deg. C. for a few days.

William Turner & Co. of Sheffield, England, have developed a new tarnish-resisting sterling silver alloy known as silanca. The alloying elements are silicon, antimony and cadmium. Although it is impossible to electroplate this alloy, its properties were studied to see if it could be used in flood lighting. At atmospheric temperature the results were pleasing, but the operating temperature of flood lights darkened the surface, probably due to the evaporation of the cadmium. Nineteen samples of silver alloys furnished by a Connecticut firm also proved unable to resist tarnishing at the high temperature.

Lengthy Investigation

An investigation was made which covered about a year in the attempt to find a reflecting material which would have a high coefficient of reflection when used at 300 deg. C. with a surface sufficiently hard so that it could be cleaned without injury. Finally, the only material which was found that would meet these specifications was stellite. An attempt was made to stamp a piece of stellite into a 6-in. parabolic reflector, but the stellite was so brittle that it could not be stamped even with repeated heatings. In addition, the cost of grinding is prohibitive as it is necessary to remove about ⅛ in. of the surface on account of air holes. The difficulty of this operation is evident when it is recalled that stellite is used for tool steel without tempering.

Since it is impossible to use stellite as a reflecting medium the components of stellite were investigated. Stellite is principally a chromium cobalt alloy. The reflection properties of cobalt were studied. It is unsatisfactory as its coefficient of reflection is low and also be-

comes tarnished with a brownish hue at a higher temperature. But the reflection characteristics of metallic chromium proved to be equal to those of stellite.

Polishes to High Lustre

Chromium plated surfaces may be polished to a very high lustre. The chromium plate has excellent adhesion to a base such as copper or iron. Strangely, although chromium is one of the most brittle metals known, it is very ductile when plated as a thin coat. This is shown by bending a strip of chromium-plated copper repeatedly. Also, the strip may be heated to a red temperature and quenched in water without the chromium plate scaling from the copper. The surface of the chromium plate is of tool-steel hardness and it is difficult to scratch it with a pin or a knife. In fact, it is possible to wipe the dust from a chromium-plated reflector with gritty waste without injury to the polish of the reflector. Ordinary emery grinding compounds would not touch chromium plate and, therefore, it was necessary to develop a new grinding and polishing compound.

Some books on the properties of chromium state that it tarnishes even more rapidly than nickel. This error is probably due to the fact that metallic chromium occurs in two separate forms, the active state and the passive state. This is similar to iron and several other metals. In the active state the tarnishing is rapid, but in the passive state there is no indication of corrosion even at relatively high temperatures. Accelerated life tests were made on chromium-plated reflectors at 300 deg. C. without indication of tarnishing.

The reflectivity of chromium is selective to about the same extent as silver. It is doubtful if the ordinary observer would be able to distinguish between the two. Therefore, the color is pleasing. The coefficient of reflection is initially high and remains high throughout an accelerated life test, having a value of about 65 per cent.

Chromium is not subject to corrosion from sulphur fumes and water vapor which is the chief cause of tarnishing of silver. Chromium is only attacked by chlorine fumes which are very rare, so the only precaution necessary in cleaning chromium-plated surfaces is to avoid the use of hydrochloric-acid polishing compounds.

Self-Tapping Steel Screws Now Used Extensively

HARDENED steel screws which cut their own threads, thus eliminating the usual tapping operation, are being used extensively in the automotive industry in place of machine screws, escutcheon pins, stove bolts, rivets, etc., for making permanent or semi-permanent fastening between various substances.

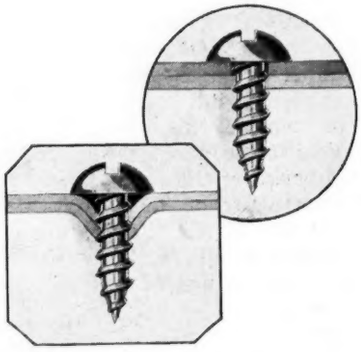


Fig. 1—Hardened steel drive screws used for making attachments to light steel or to solid castings. Lower view shows relative size of drilled hole necessary. Screws are hammered in and cut their own threads

Hardened metallic drive screws are used for making permanent fastenings to steel, cast iron, brass and aluminum castings, Bakelite, fibre, etc. These screws have a very coarse pitch and the threads are made of hardened steel so that they tap their own path through the metal. A hole slightly smaller than the screw is drilled in the metal, the screw inserted and then hammered home. As it is hammered in the screw revolves slowly, following the path cut by its hardened threads and since there can be no play between the threads of the screw and those in the metal object it is claimed that it is impossible for these screws to come loose regardless of the vibration to which they are subjected.

Obviously, screws of this type can not be removed so they are suitable only for installations where a permanent fastening is desired.

Another type of screw which can be used in place of machine screws, stove bolts, tap bolts, rivets, etc., for fastening objects to sheet metal is called the Hardened Sheet Metal Screw. They are made of steel and resemble a wood screw except that they are not tapered until a short distance from the end. Like the drive screws the threads are hardened so that they can cut sheet metal like a tap.

In using these screws a hole slightly smaller than the screw is punched or drilled in the metal, the screw inserted and screwed in with a screwdriver. Their holding characteristics are the same as the drive screws in that the threads of the screw and those of the metal have no play between them and vibration can have no effect on the tightness of the connection. They can be removed and used over again like machine screws.

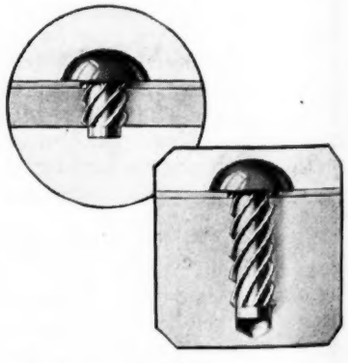


Fig. 2—Sheet metal screws used for attaching to sheet metal. Upper view shows hole drilled in metal and lower view shows punched hole. Either method is satisfactory as the screws cut their own threads and form a rigid connection

These screws are being put to many uses in the automotive industry, especially in body building and as the present trend toward all metal bodies progresses it is probable that screws of this type will be used more extensively.

Self-tapping screws are made by Parker-Kalon Corp. Drive screws are furnished in 30 stock sizes ranging from .052 in. to .218 in. in diameter and from ⅛ in. to ¾ in. in length. Sheet metal screws are furnished in 6 stock sizes and special sizes can be made to order to meet most any requirement. Either flat or round heads are available and various finishes.

Just Among Ourselves

Driver Examinations Have Limited Effect

NEW evidences continue to accumulate that examination of drivers accomplishes relatively little as an accident deterrent. We were interested in the statement which has just come in from Dr. W. V. Bingham, director of the Personnel Research Federation. A series of investigations made recently by him show that motor accidents are more common among highly intelligent drivers than among drivers of inferior ability. "Data gathered over a period of years," Dr. Bingham's report says, "show a greater proportion of accidents among professional men, doctors, lawyers and business men, than among delivery boys, truckmen, taxi drivers and laborers." Then he goes on to point out the logical idea that the problem is to find the most potent incentives to help people prefer to be careful and considerate. Toward that rather indefinite goal, it seems to us, the accident prevention movement must approach. Accidents due to physical defects or mental incapacity, which can be determined by a cursory examination, are a very small proportion of the total.

Two New Elements in the Atomic Scale

TWO more elements have been discovered recently, and there now remain unknown only three of the 92 of which all matter is supposedly composed. Five years ago there were still six missing, but in 1922 one of these was discovered, and two more have been found since. The theory that there is a total of 92 elements is based on the fact that all of the known elements can be arranged in a series according to their atomic weights, beginning with hydrogen of an atomic weight 1 and ending with uranium of an atomic weight 238.5. In this series hydrogen is No. 1 and has an atomic ordinate of 1, while uranium is No. 92. However, including the newly discovered elements, only 89 are known so far, and there are definite gaps in the series where those that still remain unknown belong. The new elements were found in the ores of platinum, and particularly the rare ore columbite, which contains columbium, tantalum, iron and manganese, and about one part of the new elements in one million parts. They were identified by X-ray spectroscopy by W. Noddack, Ida Tacke and Otto Berg at the University of Berlin and in the laboratory of the Siemens & Halske Wernerwerk. The new elements, which have been named masurium (Ma) and rhenium (Re) should have atomic weights of approximately 99 and 188.

Where Science Touches on Individual Thought

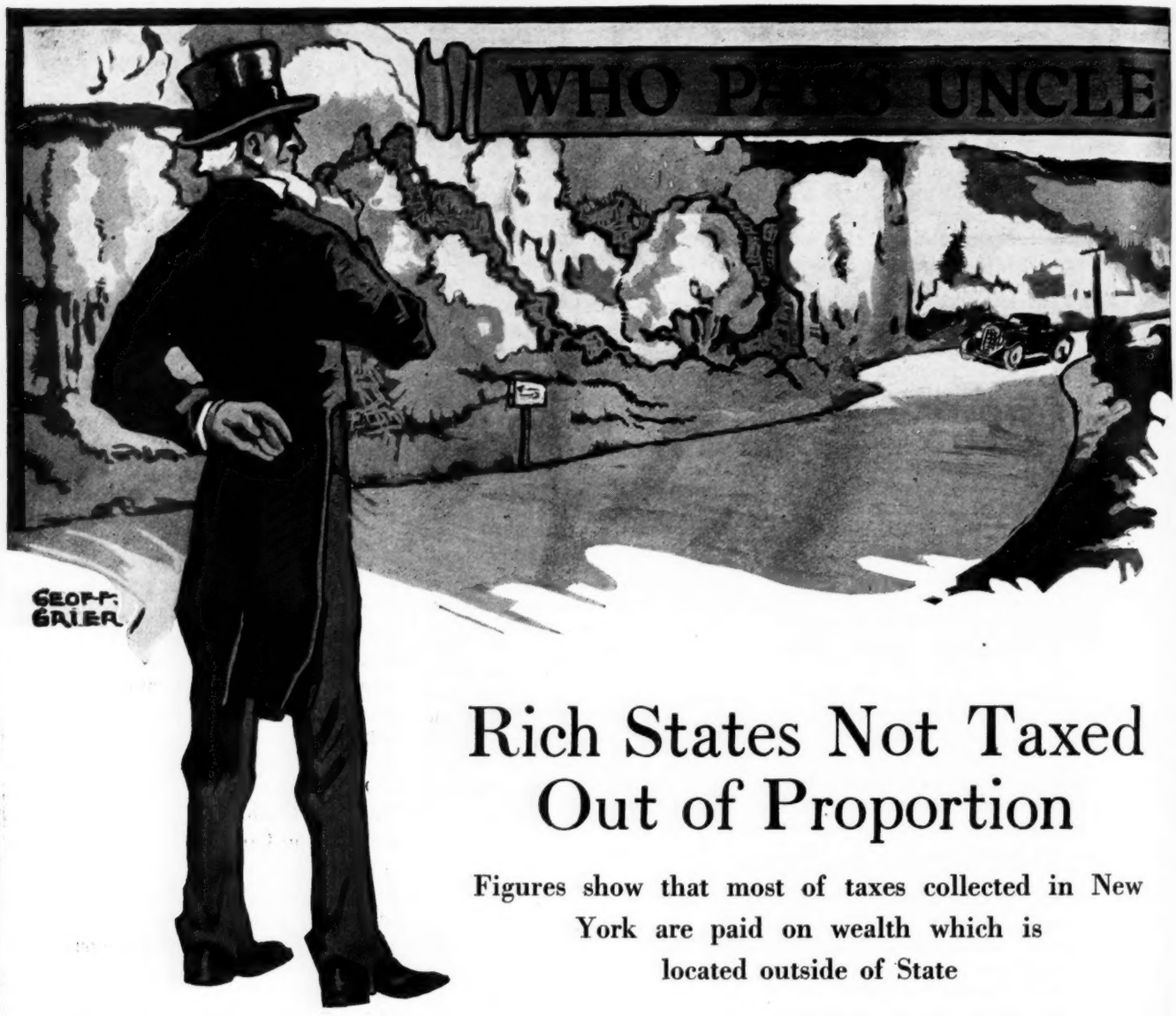
THIS development brings to mind again the fact that of new scientific developments for some years past, practically all have tended to indicate the unity of matter—and as a result the necessity for study of science as an all-embracing subject rather than as a group of separate topics divided into the watertight compartments of physics, chemistry, biology, etc. Difficult as it is for the laymen—and we venture to say for most automotive engineers—to follow with full comprehension the meaning of modern experiments as regards the origin and character of matter, some general understanding of these developments is almost necessary to any intelligent conception of the broader phases of philosophy and economics as well as of engineering. Interest in such matters isn't always easy for the individual to maintain, particularly in the early stages of his mental ramblings in this field. Discovery of a dead body gets front-page mention in the newspaper, but discovery of two new elements is lucky to get a couple of sticks after the real estate notes. But the field for mental speculation which opens up to even the casual explorer in the realms of modern atomic theory is so broad and stimulating as to make well worth while the effort necessary to reach at least its borders. Charles F. Kettering's work and discussions, perhaps more than those of any other automotive man, illustrate the possibilities of the sort of thing we're talking about.

Airplane Cheaper for Dusting Crops

FIGURES given out by the Agricultural Experimental Station at Tallulah, La., on comparative costs of dusting crops from the ground or by airplane show that a considerable saving is effected by the use of aircraft. The average cost of dusting an acre of ground by the use of tractors or horse-drawn vehicles averages $7.26 per acre for five applications, this number being accepted as the standard number of applications required for one season's crops. The price per acre, on the other hand, charged by The Huff Daland Dusters, Inc., is $7 per acre, a saving of 26 cents per acre, aside from the fact that, whereas only thirty acres can be covered by a mule drawn ground machine in one night, about 200 to 1000 acres, depending upon local conditions, can be dusted in a single hour by airplane.

Thus another proof of the economic utility of the airplane is given.

N. G. S.



Rich States Not Taxed Out of Proportion

Figures show that most of taxes collected in New York are paid on wealth which is located outside of State

THERE is no question that the majority of people in the United States look favorably upon the plan of Federal aid for State highway construction. Under this plan the Federal Government cooperates with the various States in road planning and building and defrays 50 per cent of the expense involved in the construction of such highways as fit into the national development program.

Meritorious as the plan has proved to be, and despite the popular esteem in which it is held, certain factions have fought it almost from the beginning. Readers of *Automotive Industries* are familiar with the argument of the opponents—that the States in which the most internal revenue is paid do not get their proportionate share of the Federal road funds.

Naturally, the opponents are found in those States which are credited with the payment of the heaviest internal revenue, principally New York and Pennsylvania.

New York argues, for example, that she pays into the Federal coffers 28.8 per cent of the nation's total internal revenue and therefore is entitled to 28.8 per cent of the funds expended through Federal Aid for State Highways. That makes a good argument if the facts are not too closely investigated, but under such an investigation as has just been completed by the American Association of State Highway Officials the facts point to a different conclusion.

The results of this investigation have just been made public, as an answer to those who claim that the States of the greatest wealth are being unduly taxed to pay the cost of Federal appropriation for State highways.

Presented under the title, "Who Pays Uncle Sam's Bills?" the report points out that the amount of internal revenue credited to a city or a State is not necessarily a true index of the district's taxable wealth. Says the report:

"States, as such, have no obligations and tabulation of receipts for the Federal Treasury, by States, is misleading, unfair and in many cases far from the truth as to who meets the assessments.

"Probably the ideal way of considering the real business affairs of the nation as transacted by present day methods would be to discard all State lines and consider New York, Boston, Philadelphia, Baltimore, New Orleans, St. Louis, Chicago, San Francisco, etc., as clearing house centers. But we have been in the habit of telling what this State does and what that State has accomplished, so long that certain results are tabulated as by States, when in reality some States would actually starve, if it were not for their neighbors. They have plenty of gold in the till but no hills on which to graze cattle.

SAM'S HIGHWAY BILLS ?

THE principal points established by the American Association of State Highway Officials, as a result of the investigation upon which this article is based, may be summarized as follows:

1—Taxes are paid by corporations and individuals, not by States, the States acting merely as collection agencies.

2—The claim that New York and a few other States carry most of the burden of Federal taxation is erroneous. The Union Pacific does not come within one thousand miles of New York State but its taxes are paid there. The same statement is true of many of the large corporations of the country.

3—The actual payments made by States are according to wealth and population. Hundreds of corporations pay taxes in New York and have their property elsewhere.

4—The Federal taxes paid by New York are much greater than those paid by Pennsylvania, yet the production of the manufacturing plants in the two States is about the same. The difference is due to taxes collected in New York from property held in other States in the country.

5—A large share of the Michigan income tax comes from the manufacture of automobiles, yet the tax is paid by the people of the forty-eight States who buy these machines. The same thing is true in North Carolina where tobacco furnishes a large medium for Federal tax collections.

6—There are more than 64,800 corporations paying taxes to the Federal Government through New York State. Most of these taxes are derived from property held in other States.

7—Thirty-eight per cent of the total bank deposits held in New York City national banks is derived from banks and trust companies outside of New York State.

8—The poorest State helps to enrich the richest State by the depletion of its natural resources and should have compensation for further development.

Some of the richest States in the Union do not annually produce one-half of 1 per cent of the basic wealth so necessary to our very national existence.

"Some States are given credit for very large payments into the Federal treasury, and the bookkeeping totals seem to give them grounds for such assumptions, but in reality it is property often thousands of miles away from the bookkeeper's desk which furnishes the taxable wealth from which the seeming excess of contributions are made.

"In entering the protest against Federal cooperation with the States in various enterprises tables have been widely published to prove that a few States really furnish more than 75 per cent of the entire amounts collected by the Federal Government for these purposes, and that they receive in return but a very small portion of what they pay into the treasury. At the same time other States are given sums far in advance of what they pay.

"Since the larger part of these Federal contributions of late years has been for highways, these highway appropriations have been singled out as especially unfair.

"In reality no State pays more into the Federal treasury than is indicated by its wealth and population.

"The total receipts of the Federal treasury, in a major part, come from internal revenue and customs duties. These two items last year constituted 83.27 per cent of the entire receipts. Since we have no way of prorating the tariff returns to the several States, this leaves us to consider internal revenue as the source from which the States pay funds direct to meet the bills of the Federal Government. Last year internal revenue represented almost 70 per cent of the total Federal receipts.

"It is impossible to make a study of this situation except by certain comparative methods. To make tabulations showing the entire forty-eight States is unnecessary and to do so simply overburdens the line of investigation and makes it more difficult for one to follow the relationship of the several States. We have, therefore, taken fifteen States from which to make certain deductions—the first fifteen States leading in various things around which center the basis for collecting funds for Federal appropriations. The items used for comparison are basic wealth, national wealth, population and internal revenue.

"The first fifteen States in basic wealth are given because, while they may not pay into the Federal treasury as much as some States which are called "industrial," and are, therefore, capable of producing larger incomes, basic wealth is of vital importance to the entire nation and States providing such wealth need the fullest development. By basic products is meant the value of one year's production of wealth from minerals, forests, animals and agriculture (see full table of basic wealth). Basic wealth gets the least return for its products. Many crops are perishable and must take the market price offered.

"Naturally, we think that States having the greatest amount of total wealth should pay the largest sums to run the Government, and population in relation to total wealth is an element for consideration.

"The fifteen States leading in basic wealth pay 72.24 per cent of the internal revenue, have 64.3 per cent of the total national wealth and 58.7 per cent of the population.

First Fifteen Ranking States in Percentage of Total Basic Wealth of the Nation Compared to Their Percentage of the Nation's Total Wealth, Their Percentage of Total Payments through Internal Revenue and Population

State	Percentage of Total Basic Wealth	Percentage of Total National Wealth	Percentage of Total Internal Revenue Paid	Percentage of Total Population
Pennsylvania ..	7.6	9.2	9.7	8.4
Texas	7.5	3.1	1.3	4.3
Illinois	5.2	7.1	7.7	6.0
California	4.8	4.8	4.6	.3.6
Iowa	4.8	3.3	.06	2.2
Ohio	4.1	5.8	5.5	5.3
Oklahoma	3.6	1.2	.04	1.9
Missouri	3.5	3.1	2.4	3.2
Minnesota	3.2	2.7	1.1	2.2
New York.....	3.2	11.7	28.8	10.2
Kansas	3.0	2.0	.07	1.7
Indiana	3.0	2.8	1.6	2.7
Wisconsin	2.9	2.5	1.4	2.4
Michigan	2.7	3.6	7.9	3.3
West Virginia.	2.5	1.4	.07	1.3
Total.....	61.6	64.3	72.24	58.7

"The fifteen States which lead in total wealth have 69.6 per cent of the total national wealth, pay 81.13 per cent of the internal revenue, have 62.2 per cent of the population and furnish 55.62 per cent of the basic wealth.

"The fifteen States which lead in population have 63.4 per cent of the total national population. They pay 86.66 per cent of the internal revenue, have 65.2 per cent of the total wealth and furnish 51.02 per cent of the basic wealth.

"The fifteen States which lead in payments of internal revenue pay 88.5 per cent of the total national internal revenue. They have 66.0 per cent of the total wealth, 61.8 per cent of the population, and supply 47.09 per cent of the basic wealth.

"The following States pay a much larger percentage than their percentage of total wealth or population—New York, Michigan and North Carolina.

State	Payments	Total Wealth	Population
New York	28.8	11.7	10.2
Michigan	7.9	3.6	3.3
North Carolina	5.7	1.4	2.3

"The question arises as to the cause for this excess of payments. In the case of Michigan it is immediately and satisfactorily explained when it is understood that 43 per cent of the total tax paid by Michigan is excise on automobiles and 73 per cent of all the automobiles excise tax of the United States is collected in Michigan. When it is known that there is an average of $31 per car collected it can be understood how this large fund is really spread out over the country, for the purchaser of the car pays the bill.

"Of the Michigan income tax, the Fords alone paid $18,901,000. It should be stated, however, that the people of Michigan have not made any claim that they are paying more than their due share of the internal revenue.

"As to North Carolina, a similar explanation can be made. North Carolina's seeming excess is even more startling, for 86 per cent of the total internal revenue paid by North Carolina is on tobacco in its manufactured form, and the purchaser, wherever he may live, pays for the revenue stamp. North Carolina likewise is not making any complaint.

"By public address and newspaper articles, broadcast throughout the country, statements have repeatedly been made that New York pays over 25 per cent of every bill that Uncle Sam must meet.

"Let us see. The keeper of accounts credits New York with having paid 28.8 per cent of the total internal revenue collected. Normally, wealth and population considered, New York should pay 10.9 per cent. If all the facts could be secured, it could easily be shown that that is really all she is doing now. Publicity of income taxes paid and much painstaking study of tabulations, some of which seem to be made more for bewilderment than elucidation, enable one to at least scratch the surface and present to the public a fair and well substantiated statement as to the real situation.

"The total internal revenue credited to New York, in round numbers, is $690,400,000. Of this amount $506,593,000 or over 73 per cent comes from corporation and individual incomes, and 40.9 per cent of the 73 per cent is from corporations. Speaking of personal income tax paid in New York, who is it that does not understand that the $7,500,000 personal income tax paid last year by Mr. Rockefeller represented earnings collected from many States. Always remember that corporations pay an income tax only when a profit exists. Such is not the case in personal obligations above certain exemptions. With corporations it is: No profits, no income tax. In 1922 (last Federal report) the corporations in New York paid 25.59 per cent of all the corporation tax of the United States and still were able to declare cash dividends to their stockholders of over $975,724,000 and also stock dividends of over $1,229,572,000. No one begrudges their prosperity. The total number of corporations in the United States paying an income tax that year was 212,535. Of this number 35,504 paid an income tax in New York—almost three times as many as Pennsylvania and yet New York has only 11.7 per cent of the total national wealth while Pennsylvania has 9.2 per cent of the total national wealth.

"Again, according to the latest Federal report (1922) the total corporation tax paid in the United States that year was $783,776,268, which was 47.6 per cent of the entire income tax. Manufacturing paid $389,776,280, or 40.9 per cent of all corporation tax or 23.7 per cent of all income tax of the nation.

Corporation Tax Payments

"New York paid 22.8 per cent of all corporation tax paid by 'manufacturing,' while Pennsylvania paid but 11 per cent. The same year manufacturing plants and equipment were valued in New York State at $2,133,897,000, while the same kind of property was valued by the Federal report at $2,193,873,000 for Pennsylvania. Since New York paid more than twice as much as Pennsylvania on a less valuation there is no other conclusion to be drawn but that there are manufacturing corporations paying income tax in New York which have no property whatsoever in that State.

"In 1921 (last Federal report) manufacturing plants in New York State showed a production of $6,973,506,000 and those in Pennsylvania a total output of $5,059,009,000. At the same time the corporations under the head of manufacturing in New York State paid a Federal tax of $89,131,469, while those of Pennsylvania $42,992,173. This shows that the industries in Pennsylvania produced 72 per cent as much as New York while the Federal tax paid was but 48 per cent as large as that of New York. No one would accuse Uncle Sam of letting Pennsylvania pay a less proportionate share than New York, hence the only conclusions to be drawn are again to assert that manufacturing corporations pay taxes in New York which have their property in other States.

"Surely a reasonable number of illustrations will serve to prove the statement that residents of New York are not the sole owners of many of the corporations paying

an income tax in that State and in many cases little or none of the property creating the profits is in that State.

"The United States Steel Corporation, in 1923, paid an income tax of $16,000,000 in New York. They have 145 plants and warehouses, only two of which are located in New York State. They have 153,350 stockholders who really paid this income tax. These stockholders hold residence as follows:

Alabama	1,678	New Jersey	6,495
Arizona	52	New Mexico	35
Arkansas	38	New York	32,322
California	2,004	North Carolina	348
Colorado	424	North Dakota	22
Connecticut	5,800	Ohio	9,574
Delaware	507	Oklahoma	84
District of Columbia	1,313	Oregon	173
Florida	364	Pennsylvania	41,917
Georgia	344	Rhode Island	1,385
Idaho	27	South Carolina	103
Illinois	10,048	South Dakota	37
Indiana	2,406	Tennessee	457
Iowa	341	Texas	215
Kansas	137	Utah	76
Kentucky	1,205	Vermont	986
Louisiana	325	Virginia	780
Maine	1,234	Washington	239
Maryland	1,493	West Virginia	2,057
Massachusetts	11,100	Wisconsin	1,112
Michigan	3,279	Wyoming	20
Minnesota	4,412	Alaska	8
Mississippi	122	Canal Zone	18
Missouri	1,347	Hawaii	21
Montana	83	Philippine Islands	9
Nebraska	168	Porto Rico	25
Nevada	20	Foreign	2,716
New Hampshire	1,835		
		Total	153,350

"Attention is called to the fact that there are more stockholders of this company living in Pennsylvania than in New York.

"Probably the most flagrant examples of the railroad situation are the Union Pacific and Southern Pacific. The Union Pacific in 1923 paid an income tax in New York of $4,500,000, and yet this road does not operate east of Omaha and Kansas City—half the length of the continent from New York State.

"The Southern Pacific paid a tax of $5,000,000 and this road does not run any nearer New York than New Orleans.

"It is well known that New York is our financial center, and we must have financial centers. On May 15, 1925, the statement of the United States Treasury Department showed that while the deposits in the New York City National banks totaled $2,218,027,000, study of this statement shows that 38 per cent of those deposits were from banks and trust companies outside of New York State.

"Before concluding it is well that we take a glance at the other side of the picture. Parties who have been protesting that their State is being assessed by the Federal Government to give funds to some far distant State seem to forget that it is the natural resources of that far distant State which enables her citizens to sit in their smug complacency.

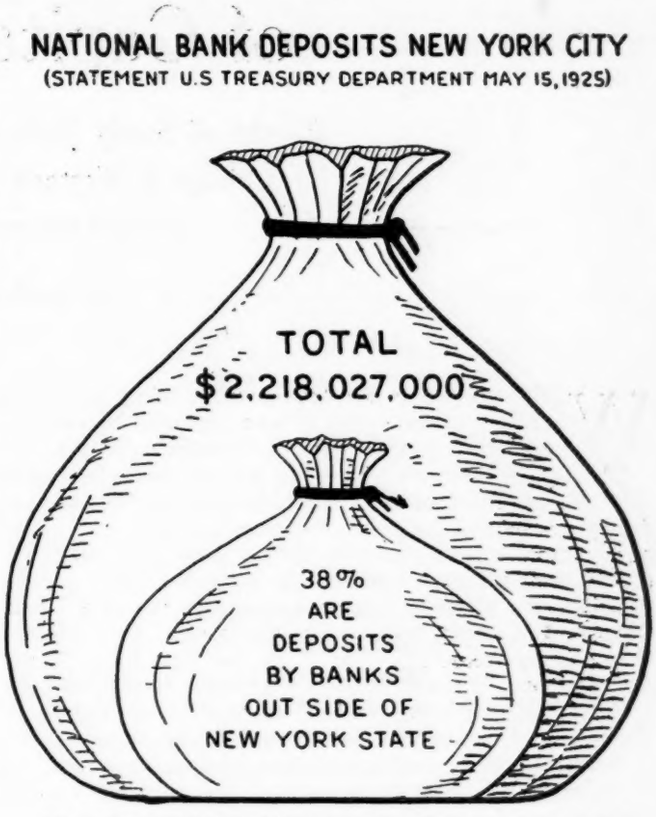
"Mines of Nevada, Utah, Montana and Colorado are emptied of their wealth, never to be reimbursed, and the profits go to residents of other States.

"Insurance—fire, life and casualty—are much needed parts of our business life—yet New York, Hartford and Baltimore are foolish to lay claim to the prosperity of these institutions.

"Boston is the center of our wool market and yet the Boston "Common" cannot take the place of New Mexico, Arizona and Utah as a sheep pasture.

"Knowing that all manufacturing in Montana last year paid out over $21,000,000 in wages and salaries alone, it is astounding to note that manufacturing metals and metal products for the entire State paid an income tax of but $17.

"Centralization of business in certain centers is a natural growth and economically sound. Surplus funds gravitate to certian cities, industries develop where power is cheapest or raw material nearest at hand. Water transportation cannot be developed around a desert town. Fertility of the soil is not the gage of land values. The Federal Constitution, at the beginning, refused to curb domestic business relations and would not allow States to set up toll gates at State lines.



All of the wealth held in New York banks should not be credited to that city. Thirty-eight per cent of the total of $2,218,027,000 in the national banks of the money center of the nation belongs to banks outside of New York State

"States do not own the corporations or the individuals in their business relations. There is not a single large city in the entire country which secures its prosperity exclusively from the citizens who live in the same State in which that city is located. The poorest State helps to enrich the richest State.

"That is a false theory which makes the claim that States contribute to the Federal Treasury. Federal funds should go for Federal needs, collected from all who have and expended so that all may have again."

AT a recent convention of the National Association of Police and Fire Surgeons, Dr. Charles Norris, chief medical examiner, said that carbon monoxide poisoning is the cause of more deaths in New York than anything else except vehicular accidents. Professor Henderson suggested that the exhaust pipes on automobiles be placed vertically. He asserted that New York had been backward in treating carbon monoxide poisoning cases with inhalation of oxygen and carbon dioxide, which method had been used extensively in other American cities and in some places in Europe.

AIR TRANSPORT INVESTMENT AND OPERATING COST—

Estimates Made as to Amount of Capital Needed

Results of Study Made for Proposed New York, Chicago & Western Airline. Costs Down as Operations Are Extended.

By Archibald Black
Consulting Air Transport Engineer

WITH interest in air transport growing daily, the need of really complete and accurate investment and operating cost figures becomes important.

During the past six years the author has given considerable attention to such questions and within the past four years he and his associates have had occasion to prepare comprehensive analyses of this kind for certain individuals and firms interested in projected routes. The figures given herewith from his report on the New York, Chicago & Western Airline (proposed) should be of more than passing interest in view of the fact that a New York-Chicago route is about to be carried into actual operation.

Some time ago the author prepared, for Barber & Baldwin of New York, a series of estimates covering the investment required for, and the cost of operating, an airplane line. Recently a release was obtained on the publication of a large portion of this information.

The projected line, the route of which is shown in Fig. 1 (see page 459), was to be operated chiefly by night and was, at the start, to be devoted exclusively to the transportation of regular first class mail, special messages and express packages.

Passenger traffic was not to be solicited at first, as past experience in the operation of airlines has shown that very serious sales resistance is encountered in the development of this class of business.

In addition, careful analyses showed that small scale operations would necessitate very high passenger fares. These high first costs become of relatively small importance in dealing with transportation of mail and packages, the individual sums involved being slight in comparison with the service rendered.

Counted on the basis of business hours lost in transit, mail and packages transported by night-operated airplanes can be delivered a thousand miles away about as quickly as they would usually be delivered twenty blocks away by present mail or express service.

The increased scale of future operations will greatly reduce the cost of running airlines while, at the same time, public confidence in their safety and reliability will be steadily built up. By the time that these elements have been fully worked out, passenger traffic is likely to develop with little solicitation.

As the estimates were prepared for investment purposes they are, intentionally, slightly on the liberal side and based upon existing types of equipment. The airplane around which they were developed was to be of conventional design and construction, all experimental development being left to the various Government bodies. Among others, the airplanes were to conform to the following requirements:

High speed not less than 125 m.p.h. (135 m.p.h. expected).

Cruising speed not less than 100 m.p.h. (105-110 m.p.h. expected).

Landing speed not over 50 m.p.h.

Range at full speed not less than 4 hours.

Engine to be Packard 600 hp. or equivalent American engine.

Pay load to be not less than 1800 lb. of packages and cargo space to be capable of carrying designed load weighing not over 6 lb. per cubic foot.

No attempt was made to actually develop a design conforming strictly to these specifications. As several types were in existence which came close to the requirements, their redesign to suit the needs would have involved no more than routine engineering problems.

For the purpose of obtaining some indication of future possibilities, the investment and operating costs were analyzed not merely for initial conditions, but also for future conditions ranging up to the operation of 50 airplanes each way per day. While it is not yet possible to closely estimate the investment and costs for the larger scales of operation, the analyses were carried into this range to provide some approximate indication of what the future might have in store. The accuracy of the estimates for the different scales of operation may be considered to range about as follows:

Estimates for 1 and 2 airplanes per day, very close.

Estimates for 5 airplanes per day, reasonably close.

Estimates for 10 airplanes per day, approximate.

Estimates for 25 and 50 airplanes per day, very rough approximations.

In preparing the analyses each of the six scales of operation was fully analyzed and parallel estimates built up. In the collection of information, upon which the equipment and cost data were based, the experience of the U. S. Air Mail Service was largely called upon on account

of this service being the nearest to an operating parallel in existence. While this *experience* was used it must be pointed out that the Air Mail *costs* were used only in the very few items where these would not vary for commercial operations.

In all other cases the costs were based upon commercial estimates obtained on specific work and material which the Air Mail experience showed necessary. In this manner the operating experience was converted to the commercial basis. In addition, the very many costs such as commissions, rent, insurance, taxes, advertising, contingencies, liability, depreciation (on replacement cost basis) and an almost endless list of other items, which a commercial project must provide for, were included.

The Air Mail, being a Government-operated line, does not include most of these items. Even in cases where some of them are included in its accounting, the allowance is made in such manner that it cannot be applied to commercial operating conditions. The net result of these conversions and additions gives an operating cost which, contrary to the almost general expectation, is higher than the Air Mail cost.

However, our figures (being prepared for investment purposes) could not include any allowances which were not capable of being checked back to actual experience. Furthermore, ordinary prudence necessarily dictated rather liberal allowances for certain items of equipment. Thus, as far as the equipment and the operating cost figures are concerned, our calculations err to some reasonable extent on the liberal side. In actual operation of the projected line it would have been probable that the costs could have been cut appreciably even for the small scales of operation. For the larger scales of operation, future developments, for which no allowance was made, would be certain to allow considerable reduction.

As each item of investment or operating cost was obtained, these were compiled in proper form in a series of some 30 or so of tables. The totals were then transferred to Tables 1 and 2 shown herewith.

Table 1 gives only the general summary of items represented in the investment apart from the operating capital. The details were developed in the tables mentioned but which are not reproduced here through space considerations. For reasons which will be discussed later, the operating capital is not

Table 1—Investment in Construction and Equipment
(For 1617-mile airline, Fig. 1)

ITEM	Headway airplanes each way per day					
	1	2	5	10*	25*	50*
Grounds, buildings & miscel.						
Ground cost						
Station fields	LEASED	LEASED	LEASED	LEASED	9,650,000	9,650,000
Emergency fields	LEASED	LEASED	LEASED	LEASED	360,000	720,000
Miscellaneous	——	——	——	——	18,000	36,000
Total grounds	——	——	——	——	10,028,000	10,406,000
Field construction						
Levelling	7,000	7,000	7,000	17,500	17,500	17,500
Drainage	6,880	6,880	6,880	13,800	27,600	27,600
Roads	3,500	3,500	3,500	7,000	10,500	14,000
Runways	4,670	14,000	28,000	28,000	65,200	130,400
Total field construction	22,050	31,380	45,380	66,300	120,800	189,500
Buildings						
Hangars	57,750	110,250	220,500	399,000	929,250	1,779,750
Shops						
Airplane	24,850	45,600	115,150	228,250	562,300	1,115,250
Engine	4,200	6,300	15,750	30,870	76,650	152,460
Garage	8,800	15,200	21,600	30,400	60,000	104,800
Warehouses	5,892	9,765	19,380	42,400	109,200	212,300
Total shops	43,742	76,865	171,880	331,920	808,150	1,584,810
Office, etc	6,325	9,500	15,750	24,525	41,160	71,715
Gasoline and oil	1,750	1,750	1,750	2,000	3,500	3,750
Total all buildings	109,567	198,365	409,880	757,445	1,782,060	3,440,025
Miscellaneous						
Lt., power & tel. extens	5,824	26,044	27,269	28,844	51,864	57,464
Wells or water extens	2,025	5,400	5,400	5,400	8,100	10,800
Fences	2,695	2,695	43,790	43,790	81,560	81,560
Total miscellaneous	10,544	34,139	76,459	78,034	141,524	149,824
Engineering, surveys, etc	47,280	54,583	70,653	92,857	170,413	274,511
Introd. costs carried as goods	50,000	50,000	50,000	50,000	50,000	50,000
Incorpn. costs, taxes, fees, etc	20,000	20,000	20,000	20,000	20,000	20,000
Total investment in grounds, buildings, and miscellaneous	$259,441	$388,467	$672,372	$1,064,636	$12,312,797	$14,529,860
Movable equipment						
Airplanes						
Complete machines	390,000	658,000	1,287,500	2,279,500	4,236,500	6,720,000
Spare parts & materials	16,645	32,257	49,961	38,535	106,290	204,092
Total airplanes	406,645	690,257	1,337,461	2,318,035	4,342,790	6,924,092
Engines						
Complete	340,000	589,000	1,181,250	1,984,000	3,692,250	6,468,100
Spare parts & supplies	26,426	50,862	80,506	114,722	271,800	528,150
Total engines	366,426	639,862	1,261,756	2,098,722	3,964,050	6,996,150
Airplane quipmt. (incl. radio)	31,200	56,400	118,450	213,400	458,000	806,400
Motor transport						
Trucks	11,920	16,820	57,780	101,520	237,620	459,900
Automobiles	7,500	8,000	13,000	18,500	26,000	34,500
Tractors	588	2,352	4,704	6,468	8,820	10,584
Total motor transport	20,008	27,172	75,484	126,488	272,440	504,984
Shop equipment						
Airplane	4,550	7,200	14,560	23,650	38,080	54,000
Engine	2,800	4,140	9,750	17,346	32,850	50,820
Garage	880	1,520	2,160	3,040	6,000	10,480
Total shop equipment	8,230	12,860	26,470	44,036	76,930	115,300
Office equipment						
Furniture & miscellaneous	9,000	13,205	21,045	27,830	40,845	55,600
Typewriters	3,856	5,346	7,712	10,604	15,775	22,260
Adding machines	2,760	2,760	3,312	4,968	7,308	9,918
Duplic., multigr. & miscl	670	970	1,370	1,770	3,180	3,680
Total office equipment	16,286	22,281	33,439	45,172	67,108	91,458
Field equipment						
Gasoline & oil handling	2,200	7,500	14,100	32,700	75,100	150,200
Meteor. instruments, etc	1,750	1,750	1,750	1,750	1,750	1,750
Oil & water heaters	490	1,575	3,395	8,925	38,200	57,000
Field maintenance	1,270	1,930	2,590	2,590	2,710	3,430
Fire prot., 1st aid & emer	3,784	6,835	13,659	25,679	54,031	89,848
Radio	38,780	38,780	38,780	44,320	44,320	60,940
Miscel. emerg. field	6,600	8,250	23,400	40,500	81,000	93,000
Miscel. station field	1,470	2,450	4,200	7,700	17,500	35,000
Beacons, land. lights, etc	172,500	172,850	182,100	191,500	228,000	231,500
Total field equipment	228,844	241,920	283,974	355,664	542,611	722,668
Total investment in movable equipment	$1,077,639	$1,690,752	$3,137,034	$5,201,517	$9,723,929	$16,161,052
Grand total of investment in construction equipment, etc	$1,337,080	$2,079,219	$3,809,406	$6,266,153	$22,036,726	$30,690,912
Total investment in construction, equipment, etc. (exclusive of operating capital) per mile of route	$827	$1,285	$2,358	$3,880	$13,630	$19,000

*Estimates approximate.

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included and must be added to the totals of Table 1 to obtain the total capital required to organize the line.

The table probably explains itself so that few comments are necessary. In small scale operations it pays better to rent landing fields than to purchase the property while in large scale operations the reverse is true. Accordingly, the investment and operating cost estimates were made on this basis, the grounds being purchased only for large scale operations. Movable equipment has been separated from construction and other costs representing items which cannot be readily transferred to another route if the occasion should arise.

Table 2, covering the cost of operation of the route for one year, gives only the general summary of the items included. Just as with Table 1, the details were developed separately. No allowance is made in the estimates for income tax, as such becomes due only when net income is shown, while the table is confined to items entering into operating cost. The totals as given include many items (such as commissions, liabilities, losses in transit, etc.) which are based upon a volume of business sufficient to cover all operating costs although these items would actually be incurred only in proportion to the business obtained. Thus, if the line is to run for some time on partial loads, the total operating costs will be appreciably decreased although the unit costs per trip or per pound-mile will be increased.

Capital charges are not included because these depend upon several considerations which do not affect other items in the table and they must, thus, be separately taken care of as will be later explained. Accordingly, the totals at the bottom of Table 2 give the operating costs carrying full loads and before allowing for capital charges.

In Table 3, the figures given in Tables 1 and 2 are applied to determine the actual total capitalization necessary to finance the line. At the start of operations and for some time thereafter, it will be almost certainly necessary for any airline to operate at a loss. This is only the condition to be expected in any new enterprise. Just how long this state of affairs will last with any given line depends upon so many considerations that we could make no generalities even if we had some past experience upon which to base them. And, as we do not even have the past experience, it is necessary to make assumptions which seem to be reasonable. Undoubtedly some lines will reach a paying basis in a short time while others will never do so and will either be forced to give up or to consolidate with some other more successful line.

To provide some reasonable basis for our assumptions regarding operating capital, we gave these a direct relation to the sums necessary to operate the system. As the initial scales of operation (1 or 2 airplanes per day) represent the worst possible conditions, we made arbitrary allowance for operating capital of sums equal, respectively, to 12 and 9 months' total operating cost. For larger scales of operation the route can be regarded as established and the operating capital need not be held in the same proportion.

From a little consideration it will be noted that the allowances are very liberal, as the calculated operating costs include many charges which are not actually paid out of the treasury. Items dependent upon the business

Table 2—Operating Cost Analyses
(For one year period and 1617-mile airline, Fig. 1)

ITEM	Headway in airplanes each way per day					
	1	2	5	10*	25*	50*
Operation (for one year)						
Rent						
Station fields	21,000	35,000	52,500	70,000	OWNED	OWNED
Emergency fields	9,000	9,000	9,000	12,600	OWNED	OWNED
Offices, exec. & local	19,600	28,500	46,425	63,600	100,050	124,350
Garages	2,520	2,520	5,040	5,040	7,560	10,080
Total rent	52,120	75,020	112,965	151,240	107,610	134,430
Supplies						
Airplane gas., oil & grease	143,100	286,200	701,250	1,405,800	3,517,800	7,018,000
Raw materials & parts	75,047	144,734	341,442	574,492	1,512,360	2,928,968
Replacements						
Washouts, airpl. eng. etc.	122,900	231,800	533,357	968,467	1,972,912	3,342,540
Engines, normal	103,440	197,200	444,000	816,000	1,720,000	3,047,200
Total replacements	226,340	429,000	977,357	1,784,467	3,692,912	6,389,740
Motor transp. supl. & reprs.	40,788	56,682	58,554	95,868	232,470	341,910
Office (incl. post. & telgr.)	21,600	33,000	54,900	75,900	116,700	166,800
Total supplies	506,875	949,616	2,133,503	3,936,527	9,072,242	16,845,418
Depreciation						
Buildings 2%	2,186	3,962	8,198	15,149	35,641	68,800
Airpl. & equip. 25%	85,050	140,600	267,881	464,206	857,156	1,363,950
Trucks & autos. 15%	2,913	3,723	10,617	18,003	39,543	74,100
Tractors 10%	59	235	470	647	882	1,058
Shop equipment 10%	823	1,286	2,647	4,404	7,693	11,530
Office equipment 10%	1,616	2,216	3,344	4,517	6,711	9,146
Field equipment 10%	22,884	24,192	28,397	35,566	54,261	72,267
Total depreciation	115,531	176,214	321,554	542,492	1,001,887	1,600,851
Plant maintenance						
Heating	2,095	3,340	6,205	15,130	36,310	61,415
Light & power	3,705	6,885	14,420	26,735	62,155	121,957
Water	889	1,654	3,461	6,416	15,157	29,270
Telephone	7,920	14,640	25,880	43,200	87,640	157,120
Paint. repairs & miscel.	8,447	13,193	24,430	42,662	92,618	67,520
Beacons & landg. lights	32,215	33,160	37,855	44,430	56,680	58,430
Total plant maintenance	55,271	72,872	112,251	178,573	351,560	595,712
Payroll						
Operating	163,400	259,200	497,350	914,100	1,919,800	3,540,200
Maintenance	55,300	86,100	168,700	293,800	605,100	1,129,700
Local offices	74,000	120,300	216,100	342,000	628,500	1,005,000
Executive office	74,400	105,500	140,900	177,500	229,300	288,000
Total payroll	367,100	571,100	1,023,050	1,727,400	3,382,700	5,962,900
Business extension						
Advertis., circular., etc.	50,000	78,000	140,000	210,000	414,000	550,000
Commissions	63,287	106,645	213,879	375,932	812,813	1,449,159
Total business extension	113,287	184,645	353,879	585,932	1,226,813	1,999,159
Insurance						
Fire	20,985	36,169	70,940	121,104	231,109	390,667
Employers' liability	5,830	10,629	24,212	47,684	110,408	215,628
Losses in transit	5,000	10,000	25,000	50,000	125,000	250,000
Accident liability	10,189	16,468	31,814	58,025	131,031	250,625
Total insurance	42,004	73,266	151,966	276,813	597,548	1,106,920
Taxes						
Real estate	3,909	7,257	14,622	24,799	331,991	390,097
Miscell. taxes	30,872	52,022	104,331	183,382	396,494	706,907
Total taxes (exclusive of income tax)	34,781	59,279	118,953	208,181	728,485	1,097,004
Miscellaneous						
Expr. R.R., exper. & incid.	42,060	77,527	163,340	287,417	600,223	1,089,950
Contingencies	66,451	111,977	224,573	394,729	853,453	1,521,617
Total miscellaneous	108,511	189,504	387,913	682,146	1,453,676	2,611,567
Grand total for one year of operation (exclusive of capital charges)	$1,395,480	$2,351,516	$4,716,034	$8,289,304	$17,922,521	$31,953,961

*Estimates approximate.

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actually obtained, and depreciation allowances, are typical charges of this kind. By drawing upon these reserves, the airline operator could, if necessary, operate at a very heavy loss for a much longer period than first impression of the operating capital allowance would suggest. Using the assumptions as to operating capital, it is thus possible to estimate the total capital required and such figures are developed in the table in a manner which should be clear without explanation.

The importance of the scale of operations and its effect upon operating costs, not to mention investment, will be readily noted. Indeed, this question of scale of operations is so important that it transcends such matters as the type of airplanes and similar problems in significance. The condition is similar to that found in almost any transportation problem. Operation of a railroad by running only one car per day over its lines would be better economically than running an airline which operated only one airplane per day. For even this one car would have much greater carrying capacity than the one airplane.

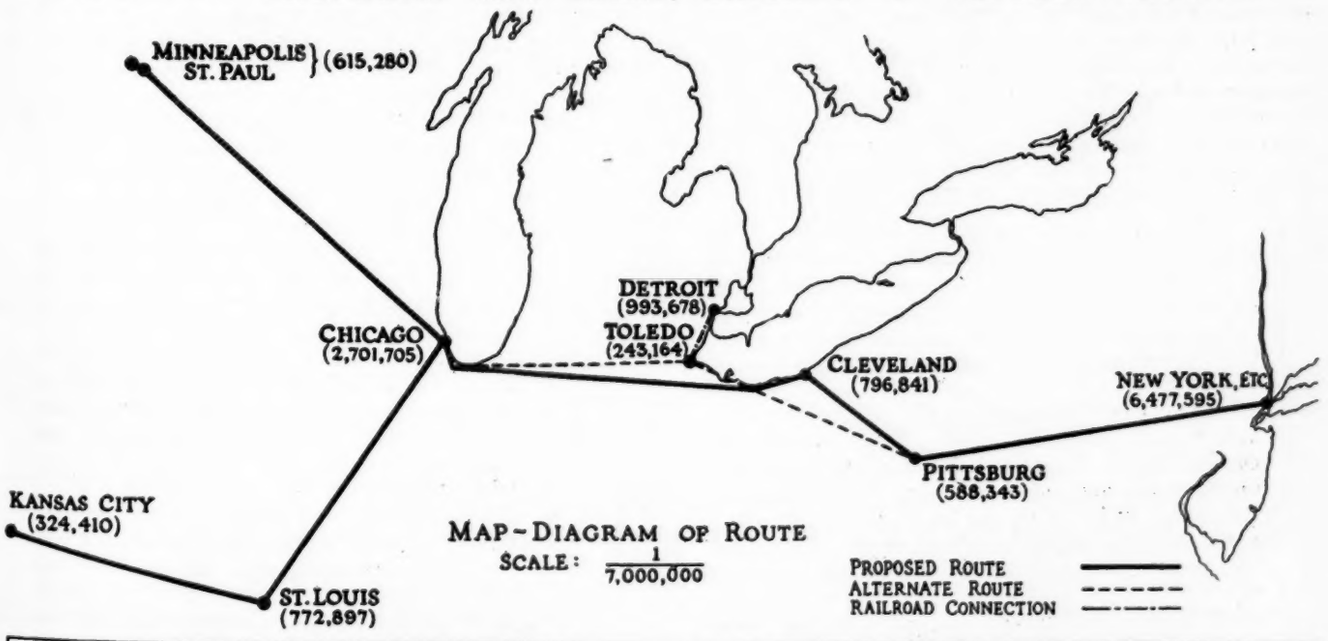
(*Continued on page* 465)

Table 3—Capitalization and derived costs
(For 1617-mile airline, Fig. 1)

Item	Headway in airplanes each way per day					
	1	2	5	10*	25*	50*
Total investment in construction, equipment, etc	$1,337,080	$2,079,219	$3,809,406	$6,266,153	$22,036,726	$30,690,912
Operating capital assumed necessary	$1,395,480	$1,763,637	$2,358,017	$2,763,101	$4,480,630	$7,988,490
Period necessary for total operating charges to equal assumed operating capital	12 months	9 months	6 months	4 months	3 months	3 months
Total capitalization on above basis	$2,732,560	$3,842,856	$6,167,423	$9,029,254	$26,517,356	$38,679,402
Capitalization per mile of route on above basis	$1,690	$2,378	$3,818	$5,580	$16,400	$23,959
Operating cost of system per day (252-day year) exclusive of capital charges	$5,540	$9,330	$18,730	$32,880	$71,200	$126,800
Operating cost of system per day (252-day year) including capital charges at rate indicated	$7,170	$11,150	$21,170	$36,100	$78,500	$137,500
	15%	12%	10%	9%	7%	7%
Operating cost per airplane mile (for 1800- pay load airplanes) exclusive of capital charges	$1.654	$1.392	$1.120	$0.9830	$0.850	$0.750
Operating cost per airplane mile (for 1800- pay load airplanes) including capital charges at rate indicated	$2.140	$1.665	$1.266	$1.080	$0.937	$0.823
	15%	12%	10%	9%	7%	7%

*Estimates approximate

ROUTE OF PROPOSED NEW YORK, CHICAGO & WESTERN AIRLINE



OPERATING CONDITIONS

VIA CLEVELAND						VIA TOLEDO					
TRIP	DISTANCE MILES ACTUAL	DISTANCE MILES PLUS 10%	FLYING TIME HRS. MIN.	EMERG. FIELDS *	BEACONS BETWEEN STATIONS†	TRIP	DISTANCE MILES ACTUAL	DISTANCE MILES PLUS 10%	FLYING TIME HRS. MIN.	EMERG. FIELDS *	BEACONS BETWEEN STATIONS†
NEW YORK-PITTSBURG	310	341	3-25	12	61	NEW YORK-PITTSBURG	310	341	3-25	12	61
PITTSBURG-CLEVELAND	120	132	1-19	4	23	PITTSBURG-TOLEDO	212	233	2-20	8	42
CLEVELAND-CHICAGO	327	360	3-36	12	65	TOLEDO-CHICAGO	225	248	2-29	8	44
CHICAGO-ST. PAUL	355	391	3-55	13	70	CHICAGO-ST. PAUL	355	391	3-55	13	70
CHICAGO-ST. LOUIS	270	297	2-58	10	53	CHICAGO-ST. LOUIS	270	297	2-58	10	53
ST. LOUIS-KANSAS CITY	235	259	2-35	9	46	ST. LOUIS-KANSAS CITY	235	259	2-35	9	46
TOTALS	1617	1780	—	60	318	TOTALS	1607	1769	—	60	316

* INCREASED FOR 25 AND 50 PER DAY HEADWAY † ALSO 7 BEACONS AT STATIONS

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Headlight Requirements Are Outlined to Illuminating Engineers

Massachusetts State motor official summarizes code of Eastern Conference of Motor Vehicle Administrators at annual meeting of the Illuminating Society. Headlamp design gets close study.

At the annual meeting of the Illuminating Engineering Society, which opened in Detroit last Tuesday, Sept. 15, Alfred W. Devine, engineer in charge of the Equipment Section, Massachusetts Registry of Motor Vehicles, presented a paper on "Improved Automobile Headlighting," in which he outlined the ideas of the Eastern Conference of Motor Vehicle Administrators on the subject.

Mr. Devine said that there are two objects which must be attained so far as practicable—sufficient illumination ahead for safe operation, and freedom from headlamp glare dangerous to other users of the highway. Any solution of the problem in the present state of the art must be a compromise.

In summarizing his paper Mr. Devine said the rules governing the approval of electric headlamps by the States should contain the following provisions:

1. No device other than a complete headlamp shall be considered for approval by the State administrator.

2. The headlamp construction must be such that the adjustment is simple and any necessary adjustment or replacement may be easily made. It should be sufficiently durable so that the shocks and strains to which a motor vehicle is ordinarily subjected shall not alter the adjustment or distort the lamp and thereby change the beam characteristics. This necessitates that:

a. The headlamp shall be mounted on a firm support and shall be adjustable for aim both in the horizontal and the vertical direction. The adjustment shall be made by loosening a single nut of standard size which is readily accessible. The mounting shall be in the vertical center plane.

b. The lamp housing shall be rigidly constructed to avoid distortion. This necessitates that the metal used shall be of suitable weight and that the edge of the housing be turned-in or that other suitable means be used to stiffen the opening. The lamp housings shall not be tied together. Any part of the mounting arrangement which is firmly fastened to the housing shall be so constructed and of such size that the connection between the two is rigid.

c. The lamp door shall be so constructed that it may be readily attached to or removed from the housing without great force and without affecting the proper position of any non-symmetrical cover glass. When the door is attached the reflector shall be protected from dust and moisture. A weep-hole shall be provided in the bottom of the door. The installation of the door shall not affect the position of the reflector in the housing. The door and housing shall be so constructed that they may be assembled in one position only.

d. If a non-symmetrical cover glass is used, the door and the glass shall be so constructed that the latter may be installed in the former in one position only and so that when installed in that position it shall be firmly held so as to prevent breakage when the door is removed. Any cover glass manufactured in production shall follow closely in material and contour that of the sample submitted for approval in order that no excessive variation in the optical characteristics of the headlamp shall result.

e. The reflector shall be constructed of non-corrosive metal of sufficient weight. It shall be plated with a good durable coating of silver or shall be of such other material as the State authority may deem acceptable. All reflectors manufactured in production shall follow closely in contour that of the samples submitted for approval. If of the paraboloidal type they shall each project a beam of light which is approximately circular in cross-section and of no greater diameter than 30 in. at 25 ft. when a properly focussed incandescent lamp, with a filament of the "V" type of which the dimensions are .09 to 0.10 in. long and 0.09 to 0.10 in. wide, is used. In the case that the lamp is adjustable for focus the reflector shall be fitted with a non-corrosive tube accurately located and of such size as to accurately guide the lamp socket. If the reflector is non-symmetrical, or if the reflector tube is not located centrally about the axis of the reflector it shall be so constructed that it may be installed in the housing in one position only and shall be firmly secured when in that position. The reflector shall be so constructed or so installed that the lamp front shall be vertical when adjusted.

f. The focussing mechanism, if used, shall be constructed of such materials that no two corrosive metals work upon each other. The mechanical construction of this part of the headlamp shall be simple and durable and the adjustment shall be made from the outside of the housing. The lamp socket shall be so constructed as to hold the incandescent lamp firmly in one position so that when assembled in the reflector there shall be no appreciable free movement of the incandescent lamp in any direction. Any adjustment shall be made either by the use of a screw driver or by means of a knurled thumb-screw.

g. The incandescent lamp shall be constructed with a filament of which the dimensions do not exceed 0.10 in. long and 0.10 in. wide. Except in the case of special lamps the filament shall be

located centrally in the spherical portion of the glass bulb within tolerances of plus or minus 1½ 64ths along the axis or at a right angle to it. In the case of special incandescent lamps, such as the two-filament lamp, the intent of these specifications shall apply. (I expect the eventual elimination of the focussing mechanism.)

h. The headlamp must be properly marked for identification. If any but a clear plane cover glass is used such cover glass shall have a distinctive name on it in letters no less than ¼ of an inch in height and in such position as to be readily seen without removing any part of the lamp. The flange of any reflector used with such a cover glass shall also be marked with the same distinctive name in letters not less than ⅛ of an inch in height. If the headlamp embodies a reflector used with clear glass the distinctive name shall be stamped into the reflecting surface in full view near the bottom edge in letters no less than ⅛ of an inch in height.

3. The headlamp must comply with specifications for a laboratory test in order that the beam projected by it shall be satisfactory in practice both for sufficient illumination and freedom from dangerous glare.

a. The test for distribution of light in the beam shall be made under standard specifications. (Consideration should be given to the formulation of specifications on the basis of luminous flux within specified zones similar to the distribution described in this paper and such specifications should be made as stringent as the Committee on Motor Vehicle Lighting of this society can agree to. In any case, a maximum limitation should be placed upon beam intensities.)

b. Measurements for glare shall be made under standard specifications. (Consideration should be given to the limitation of candlepower at the "C" point to a maximum of 100 cp. from any segment of each headlamp formed by two radial lines making an angle of 45 deg. with each other, and 50 cp. maximum at the "D" point from any similar area.)

4. No deviation in lamps manufactured for production which affects the optical characteristics, simplicity, adjustability or durability of the lamp shall be permitted unless additional samples are submitted for inspection.

Study Shows Striking Divergencies in State Motor Lighting Regulations

Length of beam required varies from 25 to 500 feet. Cities and counties exercise regulatory powers in two States. Chart shown.

THE chart which appears on the following two pages has been compiled by the National Lamp Works of the General Electric Co. and should be of considerable value to automobile manufacturers in determining the lighting equipment needed to comply with the many conflicting State regulations.

To equip a motor vehicle with lights which will be legal in every State requires first a careful study of the various requirements. This study is made more difficult by the fact that in Louisiana, counties and cities, and in Oklahoma the municipalities, hold the regulatory powers. Study of the chart discloses that in some features practice of the several States is fairly uniform while in others it is widely divergent.

Thus nearly all States seem to be united on the period from one-half hour after sunset until one-half hour before sunrise as being the time when automobile lamps should be lighted, but their views as to the distance objects should be visible ahead of the car vary from 25 ft. in Delaware to 200 ft., which distance has the greatest number of adherents. Nine States specify that lights must be visible 500 ft. ahead of the car, 15 States specify 200 ft. as the proper distance and there are a few scattering votes for intermediate distances.

White is the standard color for headlights while a few States offer options of amber or any tint except red. The height of headlights above the road varies from 42 to 56 in. while there is a fairly uniform belief that high intensity beams should not rise above 42 in. at a distance 75 ft. ahead of the car. Maximum candle power permissible varies from 21 to 36, with 21 and 32 being the most popular limitations. Twenty States publish a list of approved headlight devices and 13 States require dimming.

In California and District of Columbia no red lights can be visible from the front and green is added to this restriction in the District. In Colorado and Florida only one headlight is required. In Maryland plain glass lenses, unless designed to prevent glare, are illegal with more than 4 c.p. bulbs. In Vermont frosted bulbs are banned.

Adjustment of spot lights varies from the Colorado regulation that the beam at 30 ft. ahead must not rise above the road at all, to Florida where the beam at a distance of 200 ft. ahead may rise not more than 48 in. above the road. In nearly every case where it is mentioned the spot light beam must be kept to the right hand side of the road. In the District of Columbia spot lights are illegal. In New Jersey they may be used, only for reading signs and addresses.

The universal color for tail lights is red, although Texas offers an option of yellow and Wyoming, one of green. The tail light must be visible anywhere from 100 to 500 ft. and must make license numbers visible from 25 to 100 ft. in the rear. The most common arrangement of parking lights required is one white light ahead and one red light at the rear, although six States require two white lights ahead. Parking lights are regulated by cities and villages in a number of States so that a census of State regulations would not give a complete picture of conditions.

Six States require stop signals on all cars and Indiana requires them on buses only. Only two States specify the color to be used and they are equally divided between red and amber.

From a study of the chart it is apparent that greater uniformity of lighting regulations is urgently needed, for the benefit of both the car owner and the manufacturer.

State Motor Vehicle

STATE	GENERAL							HEADLIGHTS														
	Regulated by	Lamps Lighted After Sunset and Before Sunrise—Hours	Front Lights Visible Ahead			Color of Front Lights	Data Applies to Vehicles Capable of Exceeding M.P.H.	Height Above Road		Objects Visible Ahead				High Intensity Must Not Rise Above	At a Distance of	Or More	When Loaded	List of Approved Devices	American Standard Specifications		Bulb Candlepower Limitations		Dimming Required	When Within
			Motor Vehicle	Motorcycle	Motorcycle Sidecar			Maximum	Minimum	Motor Vehicle	Motorcycle	Objects Visible to Side	And Ahead						Motor Vehicle	Motorcycle	Maximum	Minimum		
Alabama	State 10-1-19	½																						
Arizona	State 6-9-21	1				White								42″	75′	Yes.					32			
Arkansas	State 2-1-24	½ or, When Objects Are Not Visible 200′					†																	
California	State 7-4-25	½						54″										Yes.	1922	1922	32	21		
Colorado	State 1921	½																					Yes.	
Connecticut	State 1921	½ and When Objects are Not Visible 200′	500′	500′		White or Amber	15 †	56″ Top		200′								Yes.	1922		21			
Delaware	State 1925	½	200′	200′		White				25′				48″	75′	Yes.	Yes.	Yes.						
Dist. of Columbia	District 5-3-25	½			500′					200′				42″	75′	Yes.	Yes.	Yes.			21	21		
Florida	State 1923	½	200′											48″	200′								Yes.	200′
Georgia	State 1921	1				White																		
Idaho	State 5-5-21	1	200′	100′																				
Illinois	State 7-1-23	1	200′			White or Yellow Amber Tint	†																Yes.	250′
Indiana	State 1925	½	500′			White		42″		200′				0″	200′						21		Yes.	
Iowa	State 1925	½	500′			White or Tinted				75′				42″	75′	Yes.	Yes.	Yes.			32			
Kansas	State 7-1-21	½	300′			White																	Yes.	
Kentucky	State 3-22-22					White or Tinted Other than Red				200′				42″	75′	Yes.								
Louisiana	Counties and Cities																							
Maine	State 1923	½					15			200′		7′	100′	42″	75′	Yes.		Yes.			32			
Maryland	State 1920	When Objects Not Visible 200′	200′	200′	Yes	White Other than Red	†							42″	75′	Yes.		Yes.	1922		32 • 21			
Massachusetts	State 1922	½	200′	200′	200′	White or Amber	†			160′	115′							Yes.	1922		21	21		
Michigan	State 1925	1				White				200′													Yes.	600′
Minnesota	State 1925	½								150′											32			
Mississippi	State 1-1-20	½	200′			White																		
Missouri	State 1921	½	500′		Yes.	White		42″		150′				42″	75′			Yes.			36	21		
Montana	State 1923	1	200′	200′			†												IES• 1920	IES• 1920	• 24		Yes.	
Nebraska	State 4-25-21	1				White								42″	75′	Yes.	Yes.	Yes.						
Nevada	State	1	500′			White or Tinted Other than Red		42″		75′				42″		Yes.	Yes.				21			
New Hampshire	State 1922	½	200′	200′	Yes.													Yes.					Yes.	
New Jersey	State 5-12-21	½	250′	200′	Yes.	White or Yellow		56″										Yes.						
New Mexico	State 3-10-21	½	500′	200′		White		48″																
New York	State 1920	½	250′	200′	Yes.					200′				42″	75′	Yes.	Yes.	Yes.	1922		21			
North Carolina	State 3-1925	½												42″	75′	Yes.	Yes.							
North Dakota	State 1923													42″	75′	Yes.								
Ohio	State 1923	½ and When Objects are Not Visible 200′	200′	200′			15			200′		10′		42″	75′			Yes.	IES• 1920		32		Yes.	200′
Oklahoma	Municipalities																							
Oregon	State 8-31-25	½	500′	500′		White		50″	24″		140′							Yes.	1922	1922	21		‡ Yes.	
Pennsylvania	State 4-28-25	1 and When Objects are Not Visible 200′	200′	200′	Yes.					160′	115′			42″	75′	Yes.		Yes.	1922	1922	21			
Rhode Island	State 1923	½	200′	200′		White																		
South Carolina	State 1922					White								0″	150′								Yes.	
South Dakota	State 1-1-20	½																					Yes.	
Tennessee	None																							
Texas	3-1925	½																Yes.	1922	1922				
Utah	State 1921	½	200′											42″	75′	Yes.					32			
Virginia	State 8-1-24	When Objects are Not Visible 200′	200′	200′	Yes.	White or Tinted Other than Red	15					7′	100′	42″	75′	Yes.		Yes.			32			
Vermont	State 1922	¾	200′			White								42″	75′			Yes.			21		Yes.	
Washington	State 1923	½	500′	500′		White				150′		10′	10′	42″	75′	Yes.	Yes.				27			
West Virginia	State 1923									200′				42″	75′	Yes.					32			
Wisconsin	State 1920	½				White	15											Yes.	IES 1920	IES 1920	32			
Wyoming	State 1-1-26	1	500′	500′		White				150′	150′	10′	10′	42″	75′	Yes.								

Electric Lighting Laws

SPOTLIGHTS										REAR LIGHTS						PARKING LIGHTS				STOP SIGNALS						REFERENCE NOTES
So Arranged that Beam at	Or More	Will Not Rise Above Road More than	And Entire Beam Directed to Right	Unless Swung to Left or Right	Or Extinguished	Height Above Road: Maximum	Height Above Road: Minimum	List of Approved Spotlights	Bulb Candlepower Limitations: Maximum	Bulb Candlepower Limitations: Minimum	Color of Lens	Light Visible to Rear	Numerals Visible to Rear	Numerals Legible to Rear	Height Above Road—Minimum	Mounted to Left of Axis	Number White Lights Ahead	Number Red Lights Rear	Visible from	Mounted Left of Axis	Required Where Hand Signals Not Visible	Visible from	In Bright Sunlight	Color of Light	List of Approved Devices	Indicator Light Required	
....	....	....	....	....	....	....	....	....	....	....	Red	....	50′	....	....	....	....	....	....	....	....	....	....	....	....	....	
100′	....	0″	½ of Road	30°	....	....	....	....	32	....	Red	....	....	....	....	....	....	....	....	....	Yes	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	Red	500′	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
100′	Yes	42″	....	....	....	72″	50″	Yes.	32	21	Red	500′	50′	....	....	....	....	1	500′	....	Yes	100′	‡ Yes.	‡ Red.	Yes.	....	‡Regulation †Does Not Include Tractors. *Modified.
30′	....	0″	¼ of Road	....	Yes.	....	....	....	....	....	Red	....	....	Illuminate	....	....	....	....	....	....	....	•	....	....	•	....	
60′	....	0″	Of Car Axis	....	Yes.	....	....	....	....	....	Red	....	50′	....	18″	....	1	1	....	Yes.	....	100′	....	....	Yes.	Yes.	*Regulation
75′	Yes.	48″	....	....	....	....	....	....	....	....	Red	....	25′	....	....	Yes.	1	1	200′	Yes.	....	....	....	....	....	....	†Does Not Include Tractors.
100′	....	0″	Of Car Axis	....	....	....	....	....	21	21	Red	500′	....	50′	....	....	1	1	500′	Yes.	....	....	....	Amber	....	....	
200′	....	48″	....	....	....	....	....	....	....	....	Not Specified	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	Red	....	Reveal	....	....	....	2	1	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	Red	....	100′	....	....	....	....	....	....	....	....	....	....	....	Yes	....	
....	....	....	....	....	....	....	....	....	....	....	Red	....	....	50′	....	....	1	1	....	....	....	....	....	....	....	....	
200′	....	0″	Of Car Axis	....	....	....	....	....	21	....	Red	....	60′	....	....	....	....	1	....	....	On Buses	....	....	....	....	....	†Does Not Include Tractors.
75′	Yes	42″	½ of Road	....	....	....	....	....	32	....	Red	....	50′	....	....	....	....	1	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	Red	....	....	50′	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	Red	200′	....	....	....	....	2	1	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
30′	....	24″	....	....	Yes	....	....	....	....	....	Red	100′	50′	....	....	Yes	1	....	100′	....	....	....	....	....	....	....	
35′	....	0″	Of Car Axis	....	....	....	....	....	....	....	Red	....	25′	....	....	....	1	1	....	....	....	....	....	....	....	....	*Regulation.
30′	....	24″	....	....	....	....	....	....	....	....	Red	....	60′	....	....	....	1	1	....	Yes.	....	....	....	....	....	....	†Does Not Include Motor Vehicles Under 10 H. P.
....	....	....	Of Car Axis	....	....	....	....	....	....	....	Red	100′	Yes.	....	....	....	1	1	....	Yes.	....	....	....	....	....	....	†Does Not Include Tractors.
100′	....	0″	....	30°	....	....	....	....	....	....	Red	150′	....	Discernable	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	Red	....	60′	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	21	....	Red	....	25′	....	....	....	1	1	....	Yes.	Yes	....	....	....	....	....	No Light on Rear of Sufficient Intensity to Glare.
....	....	....	....	....	....	....	....	....	....	....	Red	....	100′	....	....	....	....	....	....	....	....	....	....	....	....	....	
30′	....	0″	....	....	....	....	....	....	• 24	....	Red	• 500′	....	....	....	....	• 2	• 1	• 500′	....	....	....	....	....	....	....	†Does Not Include Tractors. *Regulation.
....	....	....	....	....	....	....	....	....	....	....	Red	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	Red	100′	50′	....	....	Yes.	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	Red	....	50′	....	....	....	1	1	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	Red	500′	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
75′	Yes	42″	Of Car Axis	....	....	....	....	....	21	....	Red	....	50′	....	....	....	2	1	100′	....	....	....	....	....	....	....	*Regulation.
75′	Yes.	42″	....	....	....	....	....	....	....	....	Red	....	50′	....	15″	....	....	....	....	....	....	....	....	....	....	....	....	
30′	....	0″	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
50′	....	0″	½ of Road	....	Yes.	....	....	....	....	....	Red	....	....	Illuminate	....	....	2	1	200′	....	....	....	....	....	....	....	*Regulation.
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
75′	....	0″	Of Car Axis	....	....	60″	24″	....	....	....	Red	100′	50′	....	....	....	1	1	....	....	Yes	....	....	....	Yes.	....	2 c.p. is Maximum for Parking. *Modified.
....	....	....	½ of Road	....	....	....	....	....	....	....	Red	....	....	Illuminate	....	....	1	1	....	....	....	....	....	....	....	....	*Regulation.
....	....	....	....	....	....	....	....	....	....	....	Red	....	60′	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	Red	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
50′	....	0″	....	....	....	....	....	....	....	....	Red	....	Yes.	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
50′	....	0″	....	....	....	....	....	....	....	....	Red or Yellow	....	....	Illuminate	....	....	....	....	....	....	....	....	....	....	....	....	....	
100′	....	0″	....	30°	....	....	....	....	....	....	Red	300′	100′	....	16″	....	....	....	....	....	Yes.	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	Red	....	25′	....	....	....	1	1	....	Yes.	....	....	....	....	....	....	
30′	....	0″	....	....	Yes.	....	....	....	....	....	Red	....	50′	....	....	....	2	1	....	....	....	....	....	....	....	....	
75′	....	0″	6′ to Right of Car	....	....	....	....	....	27	....	Red	200′	60′	....	....	....	1	1	200′	....	Yes	....	....	....	Yes.	....	
75′	Yes.	42″	Of Car Axis	....	....	....	....	....	....	....	Red	100′	50′	....	....	Yes.	....	....	....	....	....	....	....	....	....	....	
50′	....	0″	....	30°	....	....	....	....	21	....	Red	500′	....	Illuminate	....	....	1	1	500′	Yes.	....	....	....	....	....	....	
75′	....	0″	6′ of Road	....	....	....	....	....	....	....	Red or Green	200′	60′	....	....	....	....	....	....	....	....	....	....	....	....	....	

Bus Transport Developing Rapidly in Many Foreign Countries

Nations heretofore without transportation systems are turning to motor vehicles rather than wait for slower and more costly development of railway systems. Owen makes world-wide survey.

HOW rapidly bus transportation has developed even in most limited automotive markets and sparsely settled districts, such as the Baltic States, Ceylon, Danzig and the Madeira Islands, is brought out in a survey of fifteen foreign countries just made by Percy Owen, Chief, Automotive Division, Bureau of Foreign and Domestic Commerce.

"In our own country," says Chief Owen in a preface to the survey, "we have witnessed what might be termed a more natural evolution of methods of transportation; only after the railroad and trolley systems had reached a high state of efficiency did the motor bus occupy an important place. Such development necessarily covered a period of a great many years.

"On the other hand, in many foreign countries the advent of the motor vehicle marked the abrupt beginning of an era of modern transportation, and in such countries national demand would not wait for the slow and costly development of more extensive steam and electric railroad systems, hence this remarkable growth of world wide motor bus transportation."

Following are concise reviews of bus conditions in the fifteen foreign countries covered in the survey:

Australia

The outstanding feature of the Australian bus situation at the present time is the large volume of traffic being handled in the more important cities of the Commonwealth and the seeming indifference of the public to the out-of-date, uncomfortable and unsafe equipment so largely in use. One of the reasons for the poor quality of equipment is that bus transport in most centers has been in the hands of a large number of small independent companies, many of whom have insufficient initial capital to purchase equipment, except on long terms at a high rate of interest. However, the situation is gradually changing, with the result that railway and tramway officials are beginning to recognize the motor bus as a dependable vehicle for mass transportation.

Brazil

There are at present approximately 50 bus lines operating nearly 60 vehicles in the State of Sao Paulo. The only buses now in use in the city of Sao Paulo and elsewhere throughout the State are of light American types having four rows of seats and a capacity of 16 passengers. American-made bodies are found to be comparatively expensive and for this reason a domestic body building industry has been built up which has served the needs of the territory very well. There are no special laws which prohibit or put obstacles in the way of bus operation.

Ceylon

There has been a remarkable increase in the number of buses operating in Ceylon during the past two or three years. For instance, in the year 1922 there were only 44 buses and trucks in this market, which number was increased to 1602 on June 20, 1925. Very few regulations exist at the present time affecting the use of buses.

China

It is generally conceded that the first bus line in China was started in 1917 in Peking. The most recent bus system was started in Shanghai in October, 1924. Opportunities for the sale of American special buses are considered very good if the market is properly approached. Opportunities arise for sales with the completion of every road between the cities of China.

Colombia

The approximate number of buses in operation in the principal cities of Colombia is 76. The attitude of the public as well as that of local authorities in this district has been very favorable toward the operation of buses. All buses are of the standard open types there being no inclosed, special or double deck cars.

Danzig

With sufficient capital, proper equipment and a single organization, it is believed that bus traffic in Danzig could be developed into a business of considerable size and profit, and if suitable connections could be found in Danzig there is no reason why American equipment could not be sold, particularly since goods from America no longer are at a disadvantage in the matter of traffic rates.

Denmark

The public's reception of buses has been favorable, unlike that of the Government authorities, who are opposed to them because of their competition with the State railways and because they are alleged to be destructive to road surfaces. The Government took up the bus problem last March with the result that a commission of 27 members was appointed to make an investigation of the entire situation and report on it. Pending the publication of the findings of this commission, no licenses for new bus lines will be granted although existing licenses will be renewed.

Dutch East Indies

The principal prospects for an increase in the use of buses lies not in the large cities but between small towns in the outlying districts which are unconnected by rail or tram lines. There is no likelihood of the de-

velopment of bus transportation between any of the large cities in this market because of the distances separating them and the existent transportation facilities offered by railroads.

Esthonia

There are at the present time about 110 buses in operation in this market of which 43 are in city circulation and the remainder in the rural districts. Approximately 50 lines are in operation which cover 2500 kilometers of road.

India

Bus transportation in India dates from about 1906. There are now several hundred bus lines operating in India which employ from 1500 to 2000 buses covering from 20,000 to 25,000 miles daily. Most of these lines serve as feeders to railroads. With few exceptions the attitude of the public towards bus transportation is favorable. Bus fares are generally very low and natives find them a great convenience for traveling over routes not served by railroads.

Latvia

Within the past year motor bus transportation in Latvia has made very rapid strides, whereas a year ago only a few buses were to be found for the first time operating in the streets of Riga. The number of those has now increased to 64 while 65 additional buses are in operation in the districts and towns, making a total of 129 for Latvia. Despite the constantly increasing number of machines they are always well filled with passengers, due to favorable public attitude.

Japan

Although there has been a remarkable development in the use of buses during the past few years, further improvement may be expected as road conditions improve. This improvement will take place in the form of expansion of existing lines and the development of new ones, while better quality and more efficient types of buses will be used in proportion to the progress made in the construction of permanent streets and highways.

Madeira Islands

At present there are approximately 20 buses engaged in interurban services which connect 8 neighboring villages with Funchal as a central point. This service has shown a healthy development as several lines have been started during the past year. There are only 80 miles of road on the Island suitable for automobile service and more than one-half of this distance is already covered by bus lines.

Philippine Islands

Bus transportation lines have done much to link the different parts of this island group. Until buses came small communities lived in a world apart, almost self sufficient. Extensive service, however, will have to await the construction of new roads and availability of capital and enterprise.

Uruguay

Bus transportation in Uruguay is in the initial stages of development. Most of the buses in operation are merely pleasure cars or trucks modified to accommodate as many passengers as possible. There is, however, beginning to be a demand for better service on the existing routes and it is probable that there will be some sales of standard bus chassis in the near future. Buses with seating capacity of from 15 to 20 persons are preferred for existing service.

Venezuela

There are now 12 buses operating on 4 lines in this particular territory. Bus service would have the advantage of being faster and more frequent than the railroad and cheaper than touring cars. The development of bus transportation in the city of Caracas is hindered by the narrowness of the streets and by the fact that existing transportation facilities are accepted as quite satisfactory.

Safetybus Body for Ford Chassis

A NEW design of bus body known as the Safetybus, designed to be mounted on the Ford 1-ton chassis, has been brought out by the Martin-Parry Corp., York, Pa. It is built of standardized take-down parts and is exceptionally light. Although both the frame work and the panels are of steel, the weight of the complete bus, with a capacity for 18 adults or 25 children, is only 3240 lb., or 180 lb. per passenger seat. The weight of the body itself is 1250 lb., or slightly over 69 lb. per adult passenger.

The Safetybus body is mounted low on the Ford 1-ton chassis with the Martin-Parry extension and semi-elliptic special bus type springs. All panels and other parts of the body are interchangeable and the company hopes that this, together with the fact that it can supply repair parts at any of its branch assembling plants, will make the new body very popular.

Air Transport Operating Cost

(*Continued from page* 459)

In this same Table 3 the unit costs of operating the system per day and per airplane mile are given. Before these are compared with any other operating cost data, it should be noted that they apply to the 1800-lb.-pay-load airplane previously described. The pay load of airplanes used by the U. S. Air Mail Service ranges from about 400 to 1000 lb. However, the cost of operation per airplane mile does not increase in anything like proportion to the increase in carrying capacity of airplanes within this range and it is thus not advisable to attempt to compare the two sets of figures on a capacity basis.

To estimate the operating cost inclusive of capital charges it becomes necessary to make some assumptions as regards the rate of return. For this purpose we neglected the question of "financial structure," as bankers term it, and assumed the same rate of return for the whole capitalization as if it was all common stock. The rate of return was determined by study of the money market as reflected on the New York Stock Exchange. Securities were selected which appeared to represent the same element of risk, etc., as would be involved in airline operation (not promotion) on the various scales tabulated. The larger scales of operation were assumed to represent stabilized conditions and the result of growth from the smaller.

The rates of return shown by the stocks in question were then applied as shown in the table and the unit operating costs, including capital charges, developed. Lest some question the 7 per cent return allowed for the very large scale operations, it might be well to point out that this rate is actually very liberal for such cases. Any airline having sufficient traffic to justify regular operation on such scales would, for several reasons, be an even better financial risk than a railroad. The investment market is certain to reflect this once some airlines become demonstrated successes and the mental inertia of the investor is overcome.

Exports of Cars, Trucks, Tires and Parts for

COUNTRIES	GASOLINE PASSENGER CARS										TRUCKS					
	Up to $500		$500 to $800		$800 to $1200		$1200 to $2000		Over $2000		Up to 1 ton incl.		1 to 2½ tons		Over 2½ tons	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
Austria			4	$3,117	4	$4,567	2	$2,744	1	$3,264						
Azores and Madeira Islands	11	$4,508	3	2,095	2	2,035	3	4,512			11	$4,524				
Belgium	336	142,967	93	58,171	72	76,849	68	106,689	6	17,873	385	148,280				
Bulgaria													2	$1,988		
Czechoslovakia			6	3,973	7	7,379	9	14,711					1	1,405		
Denmark	792	319,672	26	18,531	63	63,758	10	15,649	3	8,720	337	123,676	1	1,452	2	$3,578
Esthonia																
Finland			8	6,493	20	20,654	2	2,773	1	2,500	1	1,181	4	5,806		
France			5	3,906	20	19,048	40	55,430	8	21,048						
Germany			107	78,290	66	71,028	59	91,305	28	70,305	8	5,025	23	26,194	1	2,403
Greece	36	17,415	13	9,969	26	26,828	12	17,048	3	8,569	11	7,509	4	5,260		
Hungary			6	4,275	2	2,016			1	2,602						
Iceland and Faroe Islands																
Italy	145	42,529	14	9,568	1	998	4	6,022			161	40,937				
Latvia	5	2,200			1	1,103	1	1,700								
Lithuania			1	560												
Malta, Gozo and Cyprus Islands					2	1,978										
Netherlands	8	4,243	73	50,163	88	97,674	67	102,192	10	28,378	1	1,181	23	4,234		
Norway	20	500	5	3,736	5	5,005					1	1,681	4	6,340		
Poland and Danzig	4	1,982	2	1,284	5	5,343	2	2,493								
Portugal	50	24,172	37	29,168	33	34,088	9	13,725	2	4,750	3	340				
Rumania			11	8,606	19	20,835	2	2,744								
Russia	6	2,160			9	8,460	1	1,370	4	14,640	175	74,720				
Spain	136	59,709	73	54,265	117	129,125	43	67,844	15	42,493	334	106,059	12	13,701	2	2,574
Sweden	10	4,890	155	120,128	159	156,069	4	5,615	1	2,500	4	2,907	10	13,355	2	2,136
Switzerland	8	4,103	22	14,132	13	11,792	9	14,308	13	32,460						
Turkey	2	840			5	4,746	11	17,450								
United Kingdom	96	31,902	420	288,436	84	82,262	261	392,719	1	4,000	120	45,052	62	62,014		
Irish Free State					23	21,278					4	2,326				
Yugoslavia, Albania, etc.			4	3,238	5	4,565			1	3,998						
United States																
British Honduras											1	394				
Canada	120	22,875	512	322,178	442	436,127	145	220,352	56	141,644	41	26,569	100	145,141	18	93,777
Costa Rica	1	352	8	6,222	9	8,862	1	1,372			7	3,336	2	4,099		
Guatemala	4	1,500			13	12,285	4	5,948			3	2,084	1	1,959		
Honduras			1	600							1	279				
Nicaragua			3	2,290												
Panama	21	6,521	11	7,015	7	6,905	4	5,944	1	2,190	16	5,808	1	1,242		
Salvador	1	380	8	6,233	2	1,938	2	3,033	1	2,500	2	940				
Mexico	520	189,140	116	80,581	109	117,679	62	93,427	11	34,758	338	112,674	19	21,679	3	7,878
Newfoundland	7	2,984	1	698	3	3,251	1	1,291								
Barbados	6	2,142	1	688	1	973	1	1,503								
Jamaica	11	3,530	16	12,096	5	5,148					19	6,308	7	8,204		
Trinidad and Tobago	47	7,388	2	1,645	1	1,200	5	7,384			2	2,093	1	1,075		
Other British West Indies	15	6,000	5	3,320	1	900	1	1,332			8	2,319	2	3,492		
Cuba	464	157,701	73	52,342	46	44,531	14	18,907	11	39,706	102	23,254	15	20,579	11	36,957
Dominican Republic	95	34,372			5	5,607	4	5,496	1	2,204	10	3,752				
Dutch West Indies	4	1,148	4	3,200	2	2,045	2	2,855			10	3,396				
French West Indies											1	352				
Haiti	6	2,565	5	3,923	3	3,416	1	1,517			4	1,930			1	1,791
Virgin Islands	1	400	1	600	1	1,000					1	435				
Argentina	1,048	409,564	143	105,596	371	393,874	68	96,599	14	45,078	48	18,718	23	33,249	10	21,532
Bolivia	1	380	10	7,398	7	7,422	2	2,767			14	6,434	3	5,084	1	3,900
Brazil	272	80,490	80	57,786	163	160,198	21	31,032	18	54,674	341	96,832	2	2,509	1	1,789
Chile	80	18,791	18	13,653	23	23,261	2	3,415	6	23,199	109	55,938	43	65,333	6	14,241
Colombia	39	14,336	20	15,919	19	20,350	14	19,900	4	11,176	68	32,533	37	35,559	3	6,933
Ecuador	4	1,200	1	653	3	2,808			1	2,732	14	6,557	1	1,813		
British Guiana	5	1,364														
French Guiana											1	352				
Dutch Guiana	1	360														
Paraguay											9	3,324				
Peru	35	10,400	9	5,074	24	25,912	6	9,232	5	16,700	61	23,590	68	76,609	1	3,551
Uruguay	26	11,911	18	13,639	25	25,802	20	29,506	7	18,865			9	13,189		
Venezuela	55	21,869	22	17,906	71	73,454	40	59,280	4	11,302	33	18,178	21	29,262	2	7,954
Aden											2	1,000				
British India	71	34,374	91	70,351	76	85,010	15	21,986			131	99,153	21	23,844		
Ceylon			15	10,969	17	17,695	1	1,696					23	24,862	4	8,932
Straits Settlements	11	4,710	37	26,783	21	21,892	8	12,063	1	2,500			3	5,822	7	16,702
China	27	9,238	19	12,550	3	3,555	5	7,639	3	7,500	23	10,666	10	10,235		
Chosen			3	2,253			1	1,572								
Java and Madura	25	12,297	96	75,129	23	24,048	12	17,832	6	14,655			4	5,726		
Other Dutch East Indies			13	8,061	7	6,469							2	2,916		
French Inda China			6	4,747												
Hejaz, Arabia and Iraq	12	3,600											1	3,100		
Hongkong			2	1,705					1	2,500	1	355				
Japan	2	1,046	18	12,863	17	16,620	17	23,225	4	11,898	4	2,408	5	16,494		
Kwangtung													2	2,655		
Palestine and Syria	109	39,918	32	24,686	9	9,267	4	5,998			6	3,327	3	6,177		
Persia	9	3,120														
Philippine Islands	185	70,493	12	7,898	40	38,187	22	34,280	9	23,418	35	15,855	9	9,319		
Siam	3	1,353														
Turkey			5	4,001												
Australia	1,838	703,600	1,156	754,580	591	646,080	137	208,831	32	92,100	140	86,420	83	105,176	39	113,206
New Zealand	146	70,426	117	82,841	263	288,474	46	66,586			37	28,245	96	109,900	4	10,916
British Oceania			6	4,639	6	5,208							1	999		
French Oceania	1	200														
Other Oceania	3	1,367	3	2,249	1	995					1	500				
Belgian Congo	22	8,092									1	308				
British West Africa	2	1,044	2	1,587	4	3,563					58	50,550	47	50,652		
British South Africa	199	88,986	231	166,558	242	253,919	41	58,917			15	11,849	25	30,357		
British East Africa	7	3,360	8	6,706	29	31,518	1	1,480			11	5,887	4	3,979		
Canary Islands	5	1,896	3	2,321	8	8,796	4	6,268			1	344	1	1,100		
Egypt	1	375	5	3,867	11	11,157	3	4,724	1	3,331						
Algeria and Tunis																
Other French Africa	8	2,464	3	2,250							19	7,380	2	2,077		
Liberia			1	548							2	812				
Morocco	17	6,726									2	1,000	6	6,874	1	2,376
Portuguese East Africa			9	7,018	5	5,668					8	1,583				
Other Portuguese Africa	1	308									4	1,408				
Spanish Africa	8	3,795	1	784							2	1,000				
Total	7,266	$2,746,210	4,070	$2,811,303	3,580	$3,742,522	1,356	$2,034,232	295	$832,730	3,324	$1,353,827	849	$1,034,090	119	$363,126

July, 1925 Canadian Exports

ELECTRIC VEHICLES		PARTS	TIRES						PASSENGER CARS						TRUCKS		PARTS	COUNTRIES
			Casings		Inners		Solids		Up to $500		$500 to $1000		Over $1000					
No.	Value	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	Value	
.....	.....	$4,874	206	$1,908	438	$718	.....	.....	2	$900	.....	.....	.....	.....	.....	.....	.....	Austria
.....	.....	967	53	573	42	63	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Azores and Madeira Islands
.....	.....	70,927	2,613	48,094	1,734	5,592	8	$564	16	5,586	.....	.....	.....	.....	.....	.....	2,831	Belgium
.....	.....	5,166	62	727	134	218	.....	.....	4	1,626	.....	.....	.....	.....	.....	.....	.....	Bulgaria
.....	.....	6,452	864	14,198	729	1,580	30	1,458	.....	.....	.....	.....	.....	.....	.....	.....	.....	Czechoslovakia
.....	.....	415,101	11,202	95,850	10,318	20,091	4	224	6	1,969	.....	.....	1	$1,208	.....	.....	18,731	Denmark
.....	.....	440	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Esthonia
.....	.....	4,645	1,486	23,353	1,385	2,896	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Finland
.....	.....	368,265	2,409	31,681	1,855	4,890	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	France
1	$2,165	63,184	2,780	45,398	5,726	12,616	.....	.....	.....	.....	.....	.....	2	2,272	.....	.....	42	Germany
.....	.....	21,063	737	12,353	3,687	14,179	359	12,635	.....	.....	.....	.....	.....	.....	.....	.....	18	Greece
.....	.....	3,062	15	210	10	24	.....	.....	2	912	.....	.....	1	1,251	.....	.....	.....	Hungary
.....	.....	2,350	25	360	134	213	.....	.....	.....	.....	.....	.....	1	1,113	.....	.....	.....	Iceland and Faroe Islands
.....	.....	63,614	171	2,710	410	802	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Italy
.....	.....	343	192	2,832	472	852	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Latvia
.....	.....	26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Lithuania
.....	.....	1,156	216	2,152	72	108	.....	.....	4	1,674	.....	.....	.....	.....	.....	.....	83	Malta, Gozo and Cyprus Isls.
.....	.....	63,929	2,765	37,288	3,028	5,137	12	375	.....	.....	.....	.....	.....	.....	.....	.....	14	Netherlands
.....	.....	8,289	2,255	32,595	1,453	2,508	8	302	9	3,654	1	$856	.....	.....	.....	.....	15	Norway
.....	.....	2,501	20	179	80	94	.....	.....	.....	.....	.....	.....	1	1,675	.....	.....	.....	Poland and Danzig
.....	.....	7,202	562	6,848	717	1,489	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Portugal
.....	.....	11,782	85	1,001	215	507	18	590	41	17,364	.....	.....	9	10,155	.....	.....	25	Rumania
.....	.....	23,190	319	5,228	616	1,431	.....	.....	.....	.....	.....	.....	6	9,007	.....	.....	.....	Russia
.....	.....	58,711	962	16,418	940	1,934	56	2,036	.....	.....	.....	.....	.....	.....	.....	.....	113	Spain
.....	.....	45,875	4,241	73,490	3,272	7,325	.....	.....	50	19,952	1	940	.....	.....	.....	.....	8	Sweden
.....	.....	10,061	532	12,393	355	1,055	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Switzerland
.....	.....	1,062	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Turkey
.....	.....	391,014	19,706	203,822	7,896	14,355	1,431	30,556	6	1,500	6	5,283	6	8,141	250	$38,610	20,644	United Kingdom
.....	.....	10,018	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	131	Irish Free State
.....	.....	590	20	347	70	147	.....	.....	11	4,656	.....	.....	.....	.....	.....	.....	.....	Yugoslavia, Albania, etc.
.....	.....	.....	.....	.....	.....	.....	.....	.....	19	3,960	.....	.....	.....	.....	2	350	46,832	United States
.....	.....	497	51	661	116	225	2	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	British Honduras
4	12,646	1,949,669	2,492	34,903	1,969	3,896	119	2,680	.....	.....	.....	.....	.....	.....	.....	.....	.....	Canada
.....	.....	2,386	117	2,234	77	239	4	106	4	1,593	.....	.....	.....	.....	.....	.....	7	Costa Rica
.....	.....	4,610	282	5,285	352	828	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Guatemala
.....	.....	3,935	56	1,379	65	178	30	1,360	.....	.....	.....	.....	.....	.....	.....	.....	.....	Honduras
.....	.....	1,179	62	859	145	273	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Nicaragua
.....	.....	18,234	988	9,976	340	805	112	1,595	.....	.....	.....	.....	.....	.....	.....	.....	.....	Panama
.....	.....	4,079	354	6,865	634	1,631	2	32	.....	.....	.....	.....	.....	.....	.....	.....	.....	Salvador
1	2,140	100,437	7,836	92,780	9,947	16,837	328	6,344	.....	.....	2	1,968	5	6,979	.....	.....	729	Mexico
.....	.....	2,254	229	2,964	258	449	2	68	3	931	.....	.....	.....	.....	.....	.....	352	Newfoundland
.....	.....	2,322	102	1,233	101	145	17	320	.....	.....	.....	.....	.....	.....	.....	.....	.....	Barbados
.....	.....	23,207	100	1,228	60	118	133	2,460	6	2,473	2	1,606	.....	.....	.....	.....	10	Jamaica
.....	.....	9,391	267	3,185	284	550	18	353	4	1,778	1	569	.....	.....	.....	.....	48	Trinidad and Tobago
.....	.....	3,244	154	2,172	251	375	2	70	4	1,682	.....	.....	.....	.....	.....	.....	46	Other British West Indies
.....	.....	112,681	5,219	59,110	8,151	12,484	634	24,170	.....	.....	.....	.....	.....	.....	.....	.....	51	Cuba
.....	.....	17,485	2,125	21,320	2,639	3,998	216	6,095	.....	.....	.....	.....	.....	.....	.....	.....	.....	Dominican Republic
.....	.....	3,822	443	4,389	413	723	2	33	5	2,061	1	846	.....	.....	.....	.....	11	Dutch West Indies
.....	.....	1,823	76	852	.....	.....	4	84	6	2,457	.....	.....	.....	.....	.....	.....	.....	French West Indies
.....	.....	8,676	348	5,441	569	1,108	.....	.....	.....	.....	1	978	.....	.....	.....	.....	.....	Haiti
.....	.....	565	75	808	87	136	10	323	.....	.....	.....	.....	.....	.....	.....	.....	.....	Virgin Islands
.....	.....	310,033	11,403	108,777	7,144	12,667	312	8,561	265	107,081	21	16,709	16	19,308	.....	.....	42,539	Argentina
.....	.....	6,505	74	1,306	42	102	.....	.....	2	811	1	628	.....	.....	12	4,679	.....	Bolivia
.....	.....	154,740	3,609	43,035	4,496	4,785	265	6,871	22	8,875	24	20,438	2	2,585	.....	.....	176,094	Brazil
.....	.....	56,268	872	18,111	308	630	46	1,733	3	1,269	.....	.....	3	4,410	.....	.....	.....	Chile
.....	.....	38,147	1,138	17,000	2,203	4,639	50	1,961	12	4,912	4	3,609	4	4,730	4	1,560	.....	Colombia
.....	.....	1,579	262	3,823	387	786	.....	.....	8	3,120	.....	.....	.....	.....	.....	.....	22	Ecuador
.....	.....	3,626	50	650	114	163	8	221	5	2,115	1	801	1	1,123	.....	.....	.....	British Guiana
.....	.....	1,037	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	French Guiana
.....	.....	667	10	81	22	34	.....	.....	1	424	.....	.....	.....	.....	.....	.....	9	Dutch Guiana
.....	.....	454	19	275	4	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Paraguay
.....	.....	55,247	842	16,190	500	1,473	38	1,259	14	5,656	1	997	1	1,189	.....	.....	33	Peru
.....	.....	53,796	1,737	19,861	1,066	1,493	31	598	37	15,709	10	6,414	.....	.....	.....	.....	.....	Uruguay
.....	.....	43,204	1,280	20,524	2,159	4,288	.....	.....	12	4,845	1	978	.....	.....	4	1,560	.....	Venezuela
.....	.....	453	157	1,442	200	282	.....	.....	.....	.....	1	895	.....	.....	4	1,288	369	Aden
.....	.....	83,854	3,221	34,697	2,774	4,368	441	8,374	460	180,923	35	22,805	1	1,281	203	70,341	71,617	British India
.....	.....	12,783	424	8,261	275	614	50	701	8	3,348	4	3,571	1	1,133	18	6,653	8,315	Ceylon
.....	.....	46,525	3,736	34,016	100	130	88	1,484	166	67,202	6	4,436	.....	.....	92	31,288	4,435	Straits Settlements
.....	.....	18,678	623	7,231	545	862	58	813	23	9,222	16	14,007	17	21,923	.....	.....	20	China
.....	.....	219	40	382	100	117	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Chosen
.....	.....	31,396	3,510	39,763	984	1,882	385	9,837	284	91,089	13	10,958	4	4,453	45	16,279	14,324	Java and Madura
.....	.....	11,240	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Other Dutch East Indies
.....	.....	1,588	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	French Indo China
.....	.....	10,078	314	2,360	214	288	10	170	6	2,460	3	2,546	.....	.....	.....	.....	.....	Hejaz, Arabia and Iraq
.....	.....	4,284	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Hongkong
.....	.....	210,028	7,020	62,447	6,360	9,332	355	5,207	68	26,996	20	12,210	.....	.....	.....	.....	.....	Japan
.....	.....	1,540	20	150	20	75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Kwangtung
.....	.....	13,575	260	4,546	266	760	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	69	Palestine and Syria
.....	.....	744	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Persia
.....	.....	44,527	5,436	60,323	4,991	7,407	120	2,517	.....	.....	.....	.....	.....	.....	.....	.....	.....	Philippine Islands
.....	.....	520	52	519	57	99	.....	.....	12	4,551	.....	.....	.....	.....	.....	.....	9,976	Siam
.....	.....	137	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Turkey
1	2,620	287,586	5,215	71,964	4,221	7,925	1,651	51,158	305	88,654	.....	.....	1	1,203	400	138,607	80,492	Australia
.....	.....	70,283	3,031	45,556	2,168	5,082	321	9,241	334	108,126	79	64,704	12	14,357	109	36,869	34,396	New Zealand
.....	.....	1,445	.....	.....	.....	.....	2	130	2	864	.....	.....	.....	.....	.....	.....	704	British Oceania
.....	.....	1,421	7	133	.....	.....	6	307	.....	.....	.....	.....	.....	.....	.....	.....	.....	French Oceania
.....	.....	1,972	87	1,024	121	226	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Other Oceania
.....	.....	703	.....	.....	.....	.....	.....	.....	10	4,148	.....	.....	.....	.....	.....	.....	.....	Belgian Congo
.....	.....	11,942	102	1,247	108	110	.....	.....	44	8,897	1	558	.....	.....	13	3,212	14,590	British West Africa
.....	.....	124,251	1,866	24,522	975	3,356	141	4,463	265	114,623	20	14,025	.....	.....	14	4,508	17,912	British South Africa
.....	.....	27,485	524	9,767	773	1,650	.....	.....	68	24,547	1	584	.....	.....	87	23,948	8,600	British East Africa
.....	.....	3,116	314	4,815	252	466	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Canary Islands
.....	.....	9,036	142	1,648	151	271	81	2,148	4	1,824	.....	.....	1	1,273	.....	.....	.....	Egypt
.....	.....	362	.....	.....	.....	.....	.....	.....	6	1,502	.....	.....	.....	.....	3	966	.....	Algeria and Tunis
.....	.....	2,483	6	108	6	14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Other French Africa
.....	.....	92	2	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Liberia
.....	.....	2,599	19	798	19	93	.....	.....	3	1,209	.....	.....	.....	.....	.....	.....	9	Morocco
.....	.....	3,653	23	173	.....	.....	.....	.....	7	2,786	.....	.....	.....	.....	3	966	466	Portuguese East Africa
.....	.....	1,504	22	318	18	46	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Other Portuguese Africa
.....	.....	268	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Spanish Africa
7	$19,571	$5,704,170	133,345	$1,597,545	116,389	$2,343	8,020	$212,633	2,648	$974,519	277	$214,919	96	$120,769	1,263	$382,684	$575,812	Total

New Timken Axle Designed for Small Buses and 1½ Ton Truck Chassis

Full floating bevel gear type provides for total weight allowance of 7000 lb. on rear wheels. Developed for use with pneumatic tires.

OF special interest to the manufacturers of small buses and 1½ ton truck chassis is the latest model standard axle to be put into production by the Timken-Detroit Axle Co., Detroit, Mich. Known as type 5620, this new full floating bevel gear axle provides for a total weight allowance, including load, of 7000 lb. on the rear wheels. The axle is sturdy in construction, having been specially developed for high speed commercial vehicle service.

The axle is designed for use with pneumatic tires only, which allows a 57 in. tread with 2 in. spokes. It is constructed with integral spring seats for mounting overslung springs 2½ in. wide and providing 39 in. spring centers using two ⅝ in. spring clips on each spring. Provision is made for the attaching of radius rods in the form of bosses on the spring seats.

The housing or body of the axle is a steel stamping of the banjo type formed of ¼ in. stock and having ends of 3⅛ in. diameter which are reinforced by heavy seamless tubular sleeves. Bolted to the front face of the housing which mounts the differential carrier unit is the pinion shaft, drive gear and differential assembly. The differential case assembly, to which the drive gear is riveted, is carried on two Timken tapered roller bearings with readily accessible adjustment for the slight wear that will take place.

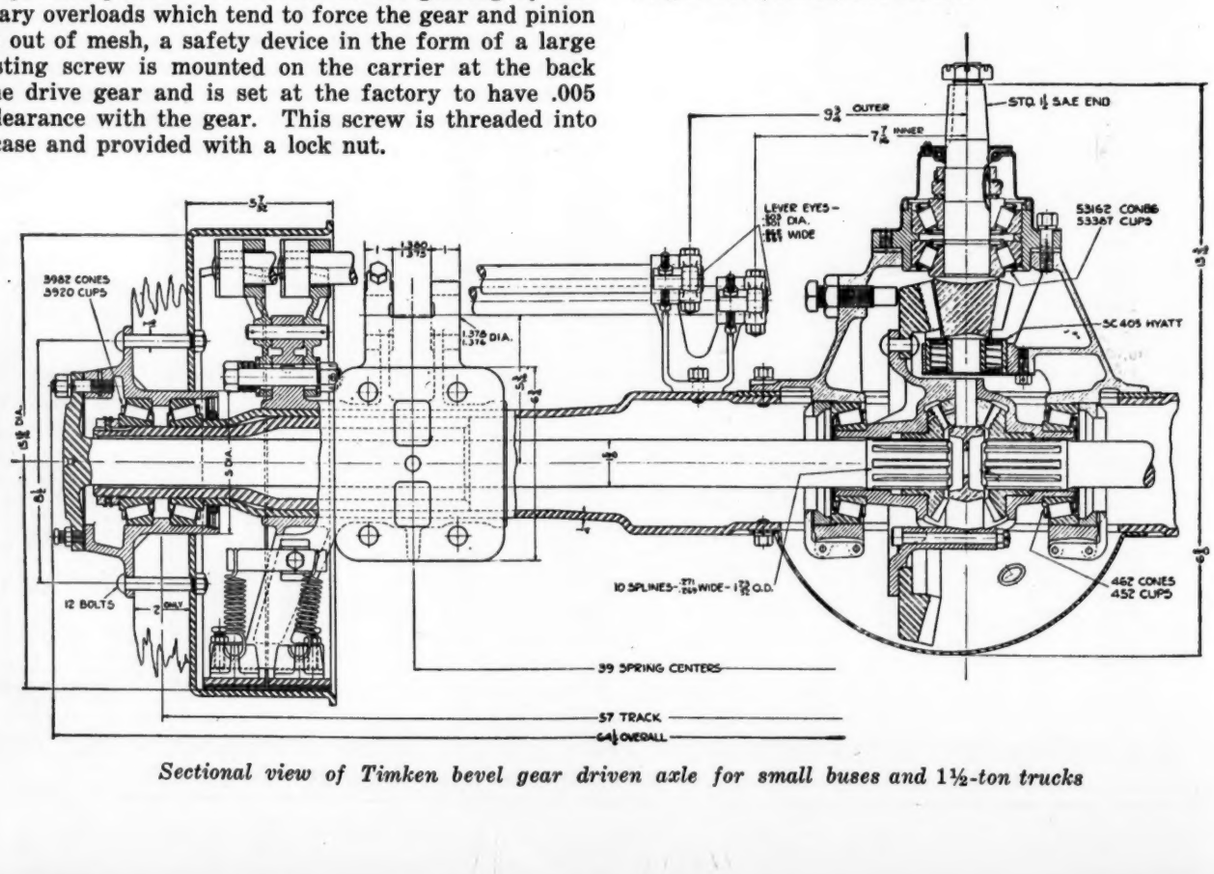
To prevent possible destruction of the gearing by momentary overloads which tend to force the gear and pinion teeth out of mesh, a safety device in the form of a large adjusting screw is mounted on the carrier at the back of the drive gear and is set at the factory to have .005 in. clearance with the gear. This screw is threaded into the case and provided with a lock nut.

Bearings are provided directly in front and in back of the pinion teeth providing a straddle type of mounting, making for exceptional ruggedness. Two Timken tapered roller bearings of the same size are mounted in front of the gear, each having ample capacity to handle the full thrust, with one bearing taking the forward thrust and the other the reverse. The rear bearing, having a radial load only, is of the straight roller type and permits an "in" and "out" adjustment of the pinion without any bearing adjustments. To take up bearing end play of the forward bearings special adjustments are provided.

Gears, which are of the helical bevel type made of chromium vanadium steel, with teeth carbonized and hardened, are dimensioned with a pitch diameter of 12-3/5 in. and tooth face 1-11/16 in. Adjustment of the pinion is accomplished by shims between the pinion cage and carrier face while the pinion cage and pinion shaft assembly are readily detachable by removing six cap screws.

Emergency and service brakes are mounted side by side inside the same drums, which are 15-15/16 in. diameter.

Malleable iron hubs, drilled for twelve 7/16 in. diameter hub bolts, for 2 in. wide wood spokes and stamped steel drums of 7/32 in. stock with reinforcing flange, are supplied as standard equipment. The axle, complete with hubs, flanges, bolts, nuts, wheel bearings and brake drums, weighs 445 pounds, not crated.



Sectional view of Timken bevel gear driven axle for small buses and 1½-ton trucks